Indian Institute of Management, Calcutta
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SURVEY of INDIA'S EXPORT POTENTIAL of MACHINE TOOLS

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SURVEY
OF
INDIA'S EXPORT POTENTIAL
OF
MACHINE TOOLS

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VOLUME II

FOREIGN MARKET SURVEY REPORTS

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FOREIGN EXCHANGE RATES

Country	Unit of currency	U.S. Cents per unit	Rupees per unit
U.S.A.	Dollar	100.000	7.500
India	Rupee	13.333	1.000
Canada	Dollar	92.500	6.940
Japan	Yen	0.278	0.021
Australia	Dollar	112.000	8.400
New Zealand	Dollar	112.000	8.400
West Germany	Deutsche Mark	25.000	1.875
Italy	Lire	0.160	0.012
France	Franc	20.255	1.519
Spain	Pesetas	1.429	0.107
Yugoslavia	Dinar	8.000	0.600
U.A.R.	Pound	287.156	21.536
Kenya	Shilling	14.000	1.050
Nigeria	Pound	280.000	21.000
Thailand	Baht	4.808	0.361
Malaysia	Dollar	32.667	2.450
Singapore	Dollar	32.667	2.450
Ceylon	Rupee	16.800	1.260
Indonesia	Rupiah	10.000	0.750
South Vietnam	Piastre	0.847	0.064
Burma	Kyat	21.000	1.575
Cambodia	Riel	2.857	0.214
Philippines	Peso	25.641	1.923
South Korea	Won	0.356	0.027

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FOREIGN MARKET SURVEY REPORT

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1. The Canadian Market for Machine Tools

The Canadian economy is closely tied to the U.S., with each being the other's most important trading partner and a large share of the capital in Canada being owned by U.S. interests. Canada's metalworking industries are concentrated in the southeast in Ontario, specially the Niagara peninsula, and to a lesser extent in Quebec, specially around Montreal. Thus, Canada's industrial belt is directly across the Canada-U.S. border from the U.S. industrial belt. The rest of Canada covers a vast area, is sparsely populated, and is based largely on primary production in agriculture, lumbering, mining etc. Canada has a population of 20 million and a per capita income of over $ 2,000.

Appendices 1, 2 and 3 give summary statistics on the metalworking industries which use machine tools. Appendix 1 gives the number of plants, value of production, value added and number of employees in Canadian metalworking industries in 1957-68. In 1968 it is estimated there were 6,850 plants with 615,000 employees producing an output of $ 14,650 million and value added of $ 6,670 million. Appendix 2 shows the number of establishments, employment, shipments, and value added for the major sectors for 1961-64, and shipments for 1965-68.

Appendix 3 shows the same information broken down by province. The major point to note from this table is the predominance of Ontario, which accounts for 68.9% of value added in these five sectors, followed by Quebec, with another 22.2%. (See Table 1). The rest of Canada has only 8.9%.

Table 1

Value Added in Major Sectors of Canadian Metalworking, 1964
(Millions of US $)

Sector	Total	Ontario		Quebec	
			Row%		Row%
Primary Metals	1,057	638	60.3	267	25.3
Metal Fabricating	981	586	59.8	245	24.9
Machinery, except Electrical	504	369	73.4	86	17.0
Transportation equipment	1,134	856	75.5	181	15.9
Electrical Products	813	578	71.0	200	24.6
Total ..	4,484	3,027	68.9%	979	22.2%

Sources: Appendices 2 and 3.

Appendix 4 gives the number of plants, employment, value added, and shipments in Canadian metalworking, by industry for 1965. Appendix 5 gives the production of selected major products by Canada's metalworking industries for 1963-65.

Appendix 6 shows the size of the metalworking plants by number of employees and factory shipments for 1965.

Table 2 shows the investment in capital machinery and equipment and repair for these five sectors in 1964, 1965 and 1968. Appendix 7 shows the capital expenditures on production machinery and equipment by all the metalworking industries in Canada 1950-67. The Canada Department of Trade and Commerce estimates of capital expenditures for 1968 for the metalworking industries represent 35% of the total for all manufacturing industries in Canada.

Table 2

Expenditures on Machinery and Equipment in Major Sectors of Canadian Metalworking, 1964-65, 1968
(Million US $)

Sector	Capital			Repair		
	1964	1965	1968	1964	1965	1968
Primary Metals	199.6	185.0	207.4	180.9	195.6	264.9
Metal Fabricating	50.9	58.6	74.9	30.6	29.2	37.6
Machinery except Electrical	32.9	28.9	40.3	12.0	10.4	16.3
Transportation Equipment	84.3	133.5	109.6	43.2	46.5	47.5
Electrical Products	34.4	42.3	63.4	21.5	21.2	25.4
Total ..	402.1	448.3	495.6	288.2	302.9	391.7

Source: 1964-65: Canada Dominion Bureau of Statistics, Canada Year Book, 1967.

1968 : Canada Department of Trade & Commerce. Data is for intended purchases.

Appendix 8 shows the number of new metalworking plants in Canada by year 1958-67, by country of affiliation, and by location in Canada. This is one important index of the market for machine tools.

2. Domestic Production of Machine Tools

Table 4 shows the levels of Canadian machine tool purchases, broken down by indigenous supply (production less export) and import.

Table 4

Canadian Purchases of Machine Tools, by Source, 1964-67
(Value in millions of US $)

Year	Total Purchases	Indigenous source	Import	Import as % of Total
1964	81.2	15.5	65.7	80.9
1965	103.3	21.0	82.3	79.7
1966	108.7	16.5	92.2	84.8
1967	110.1	14.0	96.1	87.3

Source: Production and Export: American Machinist.

Table 5 gives a further breakdown of production by type for 1964-1966.

Table 5

Canadian Production of Metalworking Machine Tools
(Value in Canadian Dollars)

	1964		1965		1966	
	No.	$ 000	No.	$ 000	No.	$ 000
Presses	432	3,689	629	5,676	-	9,556
Milling Machines	*	*	*	*	713	3,615
Other Machine Tools	-	9,856	-	11,246	-	15,807
Machine Tool Parts & Accessories	-	865	-	1,173	-	3,493
Total ..		14,410		18,095		32,471

* Included with "Other Machine Tools".

Source: Maclean-Hunter Research Bureau.

Canada is not a major manufacturer of machine tools and it can be seen that foreign machine tool manufacturers dominate the supply of machine tools to Canada. Maclean-Hunter Research Bureau estimates 1967 and 1968 Canadian production of machine tools at about US $ 30 million, of which about one third is exported (Table 6). (Data in Tables 4, 5 and 6 come from different sources and do not agree).

Table 6

Canadian Production of Machine Tools and Destination, 1964-67
(Million US Dollars)

Year	Production	Domestic Sale	Export
1964	23.8	15.5	8.3
1965	28.0	21.0	7.0
1966	31.0	16.5	14.5
1967	24.0	14.0	10.0

Source: American Machinist

There is no indication that Canadian machine tool production will increase in relation to consumption, since Canada has no basis for a competitive advantage.

Maclean-Hunter Research Bureau estimates that there are approximately 20-30 machine tool builders in Canada, most of them very moderate in size.

Among the producers of machine tools in Canada are the following:

a) Standard-Modern Tool Company, Toronto, a subsidiary of of a British company, produces small standard lathes with upto 17" swing and radial drilling machines.

b) Fritz-Werner, a 55% owned subsidiary of Fritz-Werner of Germany.

   i) assembles number 2, 3, and 4 knee-type milling machines, including ones adapted for numerical control, from complete parts imported from Germany; and

   ii) produces automatic machining centres.

   In 1967, it did $ 2.5 million in sales.

c) Ex-Cell-O Corporation of Canada Ltd., London, Ontario, an affiliate of the U.S. company, makes turret milling machines, surface grinding machines.

d) E.W. Bliss (Canada) Ltd., Georgetown, Ontario, builds presses.

e) Brown Boggs Foundry and Machine Company Ltd., Hamilton, Ontario, produces sheet metalworking machinery.

f) Sperry Gyroscope, Div. Sperry Rand Canada Ltd, Montreal, manufactures control units for numerical control machine tools.

Table 7 in the next page shows average wages of machinists and tool and die makers in the areas where machine tools are made, for 1965.

Table 7

Average Wage for Machinists and Tool and Die Makers, October 1, 1965
(US Dollar per hour)

	Montreal, Quebec	Toronto, Ontario	Hamilton, Ontario
Machinist	2.36	2.50	2.73
Tools and Die Maker	2.43	2.68	2.64

Source : Canada Dominion Bureau of Statistics, Canada Year Book, 1967

3. Imports of Machine Tools into Canada

3.1 Description of Imports

Table 8 gives total Canadian imports of machine tools and imports from the U.S. and U.K. for 1964-67. Appendix 12 gives a breakdown by type of machine tool as well as by country of origin.

Table 8

Canadian Imports of Machine Tools, 1964-1967
(Value in '000 of US Dollars)

Year	All countries value	United States		United Kingdom	
		Value	Row%	Value	Row%
1964	71,809	55,087	76.7	8,971	11.1
1965	89,711	67,663	75.4	9,312	10.4
1966	99,979	72,032	72.0	12,321	12.3
1967	104,203	64,056	61.5	15,033	14.4

The two most notable facts about the origin of imports are the dominant position of the U.S. and among the remaining imports, the leading role of the U.K. In 1967, 61.5 percent of Canada's machine tool imports came from the U.S. and in 1966 sales to Canada represented 28% of U.S. machine tool exports, the largest share to any single country. However, the U.S. share of Canadian imports fell from 76.7% in 1964, reflecting the increasing difficulties faced by the U.S. in export as well as increased efforts in Canada by other exporters. The share of Japan and Czechoslovakia have been increasing. Appendix 13 gives details of these imports from the U.S. for 1965-67, and Appendix 14 gives details for imports from Italy, Japan, Switzerland, UK and West Germany for 1964-67.

3.2 Import Barriers : Tariffs

Canada's tariff is protective, with differentiation between goods produced and not produced in Canada and with different rates for Commonwealth and non-Commonwealth countries. Before the Kennedy Round in 1967, there were four tariff rates applied to machine tool imports into Canada. For "machine tools of a class or kind" made in Canada, the most-favoured-nation rate was 22½% and the British Preference Tariff was 10%. For "machine tools "of a class or kind" not made in Canada, the MFN rate was 7½% and the BP tariff was 0%. A machine was considered as not made in Canada unless the Canadian manufacturer supplied at least 10% of total domestic requirements for this type of machine; in practice there was uncertainty as to how a product would be classified.

In the Kennedy Round a single consolidated tariff classification (42700-1) was established for machines and control equipment of a wide variety of types. Effective in 1968, the full Kennedy Round reduction was made, and the MFN rate is 15% and BP tariff is 2½%. A board has been set up to recommend full remission of these tariffs, on a case-by-case basis, for machines which are not available from Canadian sources. However, the definition of whether a machine is made in Canada has been changed so that it will be more difficult to get a tariff concession on this ground. A machine is now considered as made in Canada as soon as a Canadian manufacturer can show that he is willing, able, and technically equipped to deliver a machine in a reasonable time.

Table 9

Canadian Tariff Rates on Machine Tools

	Pre-Kennedy Round		Post-Kennedy Round	
	MFN	BPT	MFN	BPT
Machine tool available from Canadian source	22½%	10%	15%	2½%
Machine tool not available from Canadian source	7½%	Free	Free	Free

4. Exports of Machine Tools

Although Canada is not a major exporter of machine tools, it is notable that Canadian machine tool manufacturers are oriented strongly toward exporting to the U.S. market rather than simply production for the Canadian market. In part this is simply because the U.S. market is so large and near, in part because the Canadian market is quite limited in size and not sufficient to achieve economies of scale. Further, the Canadian machine tool manufacturers are located in the Canadian industrial belt of Ontario and Quebec, just across from the large U.S. machine tool market.

Table 10 shows exports of Canadian machine tools in 1962 through 1967. On the average during 1964-67, a quarter to a half of Canadian machine tool output was exported. The most notable feature of Canadian exports is their concentration on the U.S. market, where 83 percent were sold in 1967.

The two machine tool manufacturers we spoke to said their major market is in the U.S. One of them exports 95% of its production to the U.S. In addition another company is a subsidiary of a U.S. company, which was assigned the Canadian firm responsibility for producing certain models, whose production has been discontinued in the U.S. for the U.S. market, The Sales Manager of one manufacturing firm is an American, and a conscious effort is being made to give the company an American image. One company said it had redesigned its machine tools over the past two years in order to increase their appeal in the U.S. market.

However, with exports of about US $ 8 million, Canada accounted for less than five percent of U.S. imports of machine tools and less than half of one percent of U.S. consumption.

Table 10

Canadian Exports of Metalworking Machine Tools, 1962-67
(Values in Canadian Dollars)

Type of Machine Tool	Country to which exported	1962	1963	1964		1965		1966		1967		1968*	
				No	Value	No	Value	No	Value	No	Value	No	Value
Boring and Drilling Machinery and Parts	United States	167,658	176,415	9	253,970	37	292,129	74	582,000	74	529,000	60	779,000
	(% of Total)	(42.3%)	(82.5%)		(92.8%)		(40.6%)				(71.2%)		
	Total	396,031	213,929	27	273,706	44	719,588	123	745,000	115	735,000	79	823,000
Lathes and Parts	United States	286,647	56,883	26	517,048	45	287,063	246	986,000	311	1,058,000	165	821,000
	(% of Total)	(73.1%)	(38.8%)		(90.7%)		(76.4%)				(85.5%)		
	Total	392,103	146,687	35	569,788	48	375,437	774	2,052,000	338	1,237,000	265	995,000
Machine Tools and Parts not elsewhere specified	United States	773,951	1,306,173	NA	1,349,776	NA	2,682,589	NA	4,869,000	NA	7,101,000	NA	5,588,000
	(% of Total)	(60.7%)	(60.5%)		(63.8%)		(62.3%)				(83.7%)		
	Total	1,274,085	2,159,105	NA	2,114,473	NA	4,303,830	NA	6,580,000	NA	8,480,000	NA	8,479,000
Total of all type of machine tools	United States	1,228,256	1,539,471		2,120,794		3,261,781		6,437,000		8,688,000		7,188,000
	(% of Total)	(59.6%)	(61.1%)		(71.7%)		(60.4%)				(83.1%)		
	Total	2,062,309	2,519,721		2,957,967		5,398,855		7,377,000		10,452,000		10,297,000

* 1968 Estimated by Maclean Hunter Research Bureau on basis of Jan-Oct Exports
NA Not Available

Source: Canada, Dominion Bureau of Statistics, External Trade, Division Trade of Canada, Exports by Commodities, Catalogue 65-004.

5. Difference in the Canadian and U.S. Machine Tool Markets

In considering the possibility of exporting, it will be natural for India to consider the U.S. and Canada together. India's competitive ability will be similar in the two, and efforts to develop markets in the two economies will be complementary because of overlap in sales promotion media and the possibility of servicing Canadian distributors from a U.S. headquarters.

Nevertheless, it is instructive to highlight the differences between the Canadian and U.S. markets for machine tools.

i) Size of Market

The Canadian market for machine tools is about 6 percent the size of the U.S. market in terms of annual purchases. In terms of number of machine tools installed in the metalworking industries, in 1968 Canada had 0.19 million or 6.6 percent of the number in the U.S. In other words, the Canadian market is smaller than the U.S. market in California alone.

ii) Loss of Economies of Scale in Marketing

Because of the smaller size of the Canadian market, certain economies of scale in marketing cannot be achieved. For example, one national distributor told us that his service and spare parts overheads were much higher in relation to sales than for his U.S. counterpart because he sold fewer units of each model but could not reduce his service facilities and spare parts inventory in the same proportion.

iii) Distribution Network

The Canadian machine tool market is not large enough to support a specialised network of independent regional machine tool distributors like that in the U.S. Instead, distribution is normally organised on a national basis by the manufacturer, manufacturer's sales agent, or importer of foreign machines who has his own sales/service force, often with several branches around Canada, and makes almost all sales direct. One national importer-distributor we spoke with said that he sold 85% of his machines directly to customers and only about 15% through independent distributors. Another said he sold 99% direct.

It should be noted that while there are not independent regional distributors in Canada as there are in the U.S., there are national distributors handling domestic and imported lines. As a result, it would very likely be easier for an Indian manufacturer to find a national distributor which back-up sales and service capability in Canada than the U.S. It should therefore be possible for the Indian manufacturer/exporter to appoint a national distributor in Canada and operate in the Canadian market either direct from India or through its U.S. office, without setting up its own office in Canada.

iv) Smaller Scale of Industrial Production

Not only is the aggregate industrial production in Canada lower than in the U.S. but the types of industrial units one finds are different. Naturally, there are exceptions, but there is a tendency for units to be smaller than in the U.S., to be less well financed, and to have shorter production runs. This has several consequences for the pattern of machine tool demand.

Because of the smaller domestic market, it is difficult for Canadian metalworking producers to compete with the U.S. in mass production items, and hence there is less demand for high production machines. Because many Canadian producers are in a weaker financial position, a larger proportion of firms must sacrifice quality to price and must buy conventional and general purpose machine tools even when more sophisticated and specialised machine tools would have economic applications. Because of shorter production runs, and because many of the units are job shops which are constantly doing different jobs, there is a larger proportion of demand for lighter weight and less powerful, general purpose, versatile machine tools. Of course, the large number of job shops and firms with short production runs makes Canada a good potential market for numerical control, but so far, presumably because of its initial expense, Canada has been much slower than the U.S. to adopt numerical control. Canada has only 2% as many numerically controlled units as the U.S.

v) Ownership

While U.S. industry is predominantly indigenously owned and controlled, a large share of Canadian industry including both machine tool manufacturers and users, is foreign (primarily U.S.) owned. Distributors told us that as a result of U.S. ownership, the decision to purchase machine tools, or even the actual purchase, for Canadian plants is sometimes made or at least influenced by the U.S. parent company. For example, these companies share the U.S. political bias against Eastern European and French machine tools.

vi) Indigenous Machine Tool Production

While the U.S. produces a full range of machine tools and supplies 90% of its own machine tool requirements, Canada produces only a narrow range of machine tools and supplies less than 20% of its machine tool requirements. This means that many machine tools exported from India to the Canadian market would not have to compete with machine tools which were not subject to a tariff-levy, while in the U.S. Indian machine tools would have to compete against U.S. machine tools which were not subject to a tariff.

vii) Export Orientation

Because of the limited size of the Canadian market, Canadian machine tool manufacturers (and users) are more oriented toward export than are U.S. producers. The two Canadian machine tool manufacturers we visited said they exported the major share of their production to the U.S. market; in one case 95% was exported. Consequently the Canadian machine tool manufacturing programmes are determined largely by the requirements of exports.

viii) Distribution of Competitive Lines

Unlike U.S. distributors who universally say thay will not handle two machine tools of the same type and size produced by different manufacturers, some Canadian distributors handle tools with similar specifications from different manufacturers, particularly where the tools are in distinct price-quality ranges so that a case can be made that they do not compete.

Appendix 1

Number of Plants, Value of Production, Cost of Materials Used, and Number of Employees in Canadian Metalworking Industries, 1957-1968

Year	Number of Plants	Value of Production	Cost of Materials Used	Number of Employees
		(millions of $ Canadian)		
1957	4,700	7,220	3,685	473,968
1958	4,940	6,730	3,285	426,359
1959	4,950	7,200	3,600	427,892
1960	4,922	7,330	3,650	417,492
1961	5,367	7,359	3,827	411,271
1962	5,418	8,486	4,440	435,879
1963	5,728	9,589	5,105	467,595
1964	6,225	10,932	5,890	520,082
1965	6,504	12,615	6,913	570,396
1966*	6,700	13,792	7,515	590,000
1967*	6,800	14,047	7,655	600,000
1968*	6,850	14,650	7,980	615,000

* Estimates - Maclean-Hunter Research Bureau.

Source: "Metalworking in Canada", A Market Analysis conducted for Canadian Machinery and Metalworking, Maclean-Hunter Research Bureau, August 1968. Taken from Canadian Dominion Bureau of Statistics.

Appendix 2

Number of Establishments, Employment, Shipments and Value Added* in Canadian Metalworking, by Sector, 1961-64; Shipments, 1965-68

Industry Group and Year		No. of establishments	Production & Related Workers			Value of shipments of Goods of Own Manufacture	Value Added
			Number	Manhours paid	Wages		
Primary Metal Industries	1961	407	69,655	145,183	348,088	1,936,996	883,488
	1962	398	71,127	148,919	363,650	2,069,810	930,098
	1963	394	72,352	154,312	383,355	2,220,977	993,795
	1964	398	77,770	167,520	427,710	2,546,923	1,136,495
	1965					2,854	
	1966					3,010	
	1967					2,940	
	1968					3,359	
Metal Fabricating Industries (except Machinery and Transportation Equipment Industries)	1961	2,964	72,156	151,367	300,215	1,510,625	754,549
	1962	3,069	79,441	168,397	341,502	1,725,984	855,500
	1963	3,116	83,185	178,170	368,172	1,877,234	918,635
	1964	3,455	89,873	193,080	413,120	2,137,178	1,055,596
	1965					2,467	
	1966					2,652	
	1967					2,495	
	1968					2,449	
Machinery Industries (except Electrical Machinery)	1961	544	28,179	59,130	121,473	658,319	354,158
	1962	572	31,015	65,867	140,067	749,648	402,871
	1963	599	34,489	72,951	161,482	884,052	448,729
	1964	650	38,275	82,372	189,959	1,077,662	540,502

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* Values in Canadian Dollars.

Appendix 2 (cont'd)

Industry Group and Year		No. of establishments	Production & Related Workers			Value of shipments of Goods of Own Manufacture	Value Added
			Number	Manhours paid	Wages		
Machinery Industries (except Electrical Machinery)	1965					1,235	
	1966					1,382	
	1967					1,377	
	1968					1,324	
Transportation Equipment Industries	1961	659	70,320	148,911	321,271	1,845,785	770,579
	1962	682	75,601	166,086	373,086	2,343,690	935,370
	1963	703	80,706	178,267	421,953	2,817,747	1,121,134
	1964	744	90,123	196,269	483,049	3,197,689	1,218,498
	1965					3,865	
	1966					4,257	
	1967					4,711	
	1968					4,903	
Electrical Products Industries	1961	533	51,904	108,483	203,006	1,208,298	619,465
	1962	531	58,029	122,113	233,250	1,389,683	736,027
	1963	545	61,241	128,594	254,017	1,545,046	784,881
	1964	578	64,079	136,979	277,019	1,703,964	874,056
	1965					1,903	
	1966					2,163	
	1967					2,154	
	1968					2,224	
Miscellaneous Metal Products	1961					200	
	1962					220	
	1963					244	
	1964					268	

Industry Group and Year		No. of establish-ments	Production & Related Workers			Value of shipments of goods of own Manufacture	Value Added
			Number	Manhours paid	Wages		
Miscellaneous Metal Products	1965					291	
	1966					328	
	1967					370	
	1968					391	

Source: (1) 1961-64: Canada Dominion Bureau of Statistics, *Canada Year Book*, 1967

(2) 1965-67: Dominion Bureau of Statistics

(3) 1968: Maclean Hunter Research Bureau Estimates.

Appendix - 3

Number of Establishments, Employment, Shipments and Value Added in Canadian Metalworking by Province and Sector, 1961-64

(Value in Canadian Dollars)

Province & Industry Group	No. of Establishments	Manufacturing Activity: Production & Related Workers: Number	Manufacturing Activity: Production & Related Workers: Manhours paid	Manufacturing Activity: Production & Related Workers: Wages	Manufacturing Activity: Value of shipments of goods of own manufacture	Manufacturing Activity: Value Added
PRINCE EDWARD ISLAND						
Primary metal industries	1	NA	NA	NA	NA	NA
Metal fabricating industries (except machinery and transportation equipment industries)	2	NA	NA	NA	NA	NA
Transportation equipment industries	9	139	300	692	1,748	688
NOVA SCOTIA						
Primary metal industries	6	NA	NA	NA	NA	NA
Metal fabricating industries (except machinery and transportation equipment industries)	49	1,224	2,680	4,995	23,031	10,818
Machinery industries (except electrical machinery)	6	265	550	1,010	2,643	1,918
Transportation equipment industries	72	3,983	8,418	16,618	59,027	28,238
Electrical products industries	3	NA	NA	NA	NA	NA

Province & Industry Group	No. of establishments	Manufacturing Activity: Production & Related Workers: Number	Manufacturing Activity: Production & Related Workers: Manhours paid	Manufacturing Activity: Production & Related Workers: Wages	Manufacturing Activity: Value of shipments of goods of own manufacture	Manufacturing Activity: Value Added
NEW BRUNSWICK						
Primary metal industries	3	41	84	113	317	200
Metal fabricating industries (except machinery and transportation equipment industries)	38	868	1,880	3,747	17,329	9,572
Machinery industries (except electrical machinery)	3	NA	NA	NA	NA	NA
Transportation equipment industries	11	NA	NA	NA	NA	NA
Electrical products industries	NA	899	1,818	2,415	12,122	6,319
QUEBEC						
Primary metal industries*	105	15,905	35,188	85,113	670,883	287,498
Metal fabricating industries (except machinery and transportation equipment industries)	874	23,725	51,236	106,153	540,764	263,117
Machinery industries (except electrical machinery)	109	7,041	15,711	31,210	184,690	91,758
Transportation equipment industries	122	16,490	35,940	81,397	376,807	194,509
Electrical products industries	125	15,781	34,832	70,314	421,347	214,868

Appendix 3 (cont'd)

Province & Industry Group	No. of Establishments	Manufacturing Activity: Production & Related Workers: Number	Manufacturing Activity: Production & Related Workers: Manhours paid	Manufacturing Activity: Production & Related Workers: Wages	Manufacturing Activity: Value of shipments of goods of own manufacture	Manufacturing Activity: Value Added
ONTARIO						
Primary metal industries*	204	48,971	104,056	269,986	1,498,167	686,141
Metal fabricating industries (except machinery and transportation equipment industries)	1,738	51,539	111,435	240,942	1,265,256	629,735
Machinery industries (except electrical machinery)	392	26,908	57,737	139,513	787,834	397,208
Transportation equipment industries	319	61,805	135,357	347,601	2,616,247	920,077
Electrical products industries	378	45,211	95,827	195,966	1,201,050	620,612
MANITOBA						
Primary metal industries*	14	2,408	4,666	11,113	42,425	22,211
Metal fabricating industries (except machinery and transportation equipment industries)	130	2,926	6,168	12,518	59,584	27,669
Machinery industries (except electrical machinery)	37	1,472	3,027	5,468	35,139	15,890
Transportation equipment industries	28	1,582	3,464	6,258	29,208	15,668
Electrical products industries	18	654	1,398	2,338	18,725	7,909

Province & Industry Group	No. of Establishments	Manufacturing Activity				
		Production & Related Workers			Value of shipments of goods of own manufacture	Value Added
		Number	Manhours paid	Wages		
SASKATCHEWAN						
Primary metal industries	4	NA	NA	NA	NA	NA
Metal fabricating industries (except machinery and transportation equipment industries)	60	745	1,531	2,923	17,613	7,949
Machinery industries (except electrical machinery)	19	202	434	830	4,752	2,706
Transportation equipment industries	6	NA	NA	NA	NA	NA
Electrical products industries	4	NA	NA	NA	NA	NA
ALBERTA						
Primary metal industries*	21	1,435	3,044	7,800	81,965	25,471
Metal fabricating industries (except machinery and transportation equipment industries)	189	3,457	7,130	15,493	80,832	38,791
Machinery industries (except electrical machinery)	26	501	1,036	2,087	15,319	6,587
Transportation equipment industries	42	995	2,074	4,014	16,562	7,720
Electrical products industries	10	265	516	836	9,908	4,158

Province & Industry Group	No. of Establishments	Manufacturing Activity: Production & Related Workers: Number	Manufacturing Activity: Production & Related Workers: Manhours paid	Manufacturing Activity: Production & Related Workers: Wages	Manufacturing Activity: Value of shipments of goods of own manufacture	Manufacturing Activity: Value Added
BRITISH COLUMBIA						
Primary metal industries*	39	5,494	11,641	31,626	167,918	76,743
Metal fabricating industries (except machinery and transportation equipment industries)	364	5,171	10,521	25,518	128,819	64,418
Machinery industries (except electrical machinery)	57	1,794	3,672	9,472	46,052	23,795
Transportation equipment industries	132	3,745	7,636	20,303	76,769	38,664
Electrical products industries	35	843	1,751	3,656	28,656	15,074

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* Incorporates revised basis of valuation ofor smelting and refining.

NOTE: NA - Not Available

Source: Canada Dominion Bureau of Statistics, Canada Year Book, 1967, Ottawa, 1967.

Appendix - 4

Number of Plants, Employment, Materials Used and Shipments in Canadian Metalworking by Industries, 1965

	No. of Plants	No. of Employees	Materials Used	Factory Shipments
			$ Canadian millions	
PRIMARY METAL				
Iron & Steel Mills	41	44,274	565.7	1,231.8
Steel Pipe & Tube Mills	21	4,799	138.9	198.6
Iron Foundries	137	11,714	71.7	167.5
Smelting & Refining	23	31,835	305.5	770.7
Aluminium Rolling, Casting, Extruding	50	4,654	110.4	154.7
Copper Rolling, Casting, Extruding	56	3,620	157.1	201.4
Metal Rolling, Casting, Extruding	73	3,736	87.1	129.4
Sub-Total	401	104,632	1,436.4	2,854.1
METAL FABRICATING				
Boiler & Plate Works	66	6,496	50.7	107.6
Fabricated Strl Metal	97	18,072	182.4	372.3
Ornamental & Architectural Metal	634	13,439	107.4	211.9
Metal Stamping, Pressing, Coating	653	27,925	334.9	609.1
Wire & Wire Products	223	16,099	206.4	356.9
Hardware, tools and Cutlery	423	13,570	79.1	202.2
Heating Equipment	106	5,711	53.0	103.4
Machine Shops	957	11,618	52.7	143.7
Mis Metal Fabricating	422	20,017	179.9	359.8
Sub-Total	3,581	132,947	1,246.5	2,466.9
MACHINERY				
Agricultural Implements	96	13,721	162.7	285.1
Mis Machinery & Equip	528	43,956	415.1	797.2
Commercial Refrigeration & Air-Cond	37	2,240	26.6	48.0
Office & Store Machinery	23	9,899	44.5	105.1
Sub-Total	684	69,816	648.9	1,235.4

Appendix 4 (cont'd)

	No. of Plants	No. of Employees	Materials Used	Factory Shipments
			$ Canadian millions	
TRANSPORTATION EQUIPMENT				
Aircraft & Parts	85	27,738	183.9	394.4
Motor Vehicles	20	42,432	1,505.6	2,120.3
Truck Body & Trailers	160	5,432	59.0	103.0
Motor Vehicle Parts, Accessories	160	31,982	418.8	755.6
Railraod Rolling Stock	13	6,002	102.8	163.0
Shipbuilding & Repairs	71	18,586	117.2	274.6
Boat Building & Repairs	242	1,876	11.1	24.6
Misc Vehicles	19	1,262	18.1	29.5
Sub-Total	770	135,310	2,416.5	3,865.0
ELECTRICAL PRODUCTS				
Small Appliances	61	5,173	51.1	104.1
Major Appliances	35	13,375	165.1	284.2
Household Radio & TV Receivers	25	7,013	101.3	155.1
Communications Equip	148	33,481	174.2	430.5
Electrical Industrial Equipment	124	21,739	155.9	375.5
Batteries	23	2,362	30.5	54.1
Electric Wire & Cable	25	7,864	182.5	274.7
Misc Elec Products	154	12,384	109.1	224.3
Sub-Total	595	103,391	969.7	1,902.5
MISCELLANEOUS INDUSTRIES				
Metal Furniture & Fixtures (est)	95	8,000	70.0	36.4
Instruments & Related Products	113	11,216	77.9	171.7
Jewellery & Silverware	265	5,084	46.6	82.5
Sub-Total	473	24,300	194.5	290.6
GRAND TOTAL	6,504	570,396	6,912.5	12,614.5

Source: "Metalworking in Canada", A Market Analysis conducted for Canadian Machinery and Metalworking, Maclean-Hunter Research Bureau, August 1968. Taken from Canadian Dominion Bureau of Statistics.

Appendix 5

Production of Selected Major Products by Canada's Metalworking Industries 1963-1965

	'000 Canadian Dollars		
	1963	1964	1965
PRIMARY METAL INDUSTRIES			
Rails, hot rolled	35,707	30,856	26,458
Wire rods, No.5 gauge to 47/64th inch Ø	52,421	58,888	59,239
Bars, hot rolled	132,304	160,869	175,914
Bars, cold rolled and cold drawn	18,594	21,906	24,018
Strip, cold rolled	19,829	22,570	21,976
Plates (excl plates for pipes & tubes) hot rolled	68,363	79,352	98,352
Steel pipe and tubing	132,308	170,697	181,103
Steel pipe fittings	8,651	10,115	10,610
Cast iron pipe and fittings	38,166	42,006	46,684
Aluminium Castings	7,996	7,797	9,844
Aluminium die castings	6,086	6,378	12,363
Zinc die castings	11,590	14,463	19,326
Sub-total ..	532,015	625,897	685,887
METAL FABRICATING INDUSTRIES			
Boilers, power and heating	48,057	49,570	57,837
Metal windows	55,326	63,547	64,547
Prefabricated & portable metal buildings and panels	27,790	27,866	30,649
Metal doors	26,737	25,124	34,146
Metal cans	123,734	130,565	147,634
Steel barrels and drums	7,904	6,326	8,108
Metal bottle caps	15,904	15,245	16,081
Sheet metal culvert pipe	19,332	22,570	27,770
Galvanised sheets	63,895	77,758	87,497
Stove and furnace pipe	6,009	7,053	6,430
Aluminium and steel roofing & siding	25,165	27,681	26,526
Steel wire fencing	6,338	6,651	7,539
Steel wire rope and cable	23,042	26,385	29,460
Welded wire mesh	12,945	15,561	16,436
Welding rods	12,230	14,279	15,944

Appendix 5 (cont'd)

	'000 Canadian Dollars		
	1963	1964	1965
Small tools, carpenters' machine etc	31,351	38,152	50,665
Wood cutting and power chain saws & parts	19,565	26,560	25,040
Builders' and shelf hardware	26,231	29,849	30,494
Other hardware, marine, pole, automobile etc	49,100	55,809	62,855
Power-type oil burners	6,068	6,704	6,704
Unit heaters	5,670	6,620	7,396
Heating radiators	12,548	11,740	12,816
Warm air furnaces	32,384	37,311	30,200
Plumbers' brass fittings	18,042	23,486	21,991
Solder type fittings	11,004	12,466	13,382
Sub-total ..	686,371	764,878	837,517
MACHINERY INDUSTRIES			
Cultivators	5,037	6,822	10,198
Air compressors	12,432	17,102	17,892
Pumps, centrifugal, deep well, sump etc	32,021	34,835	38,971
Conveyors and conveying systems	28,069	35,853	40,361
Elevators	37,791	45,083	57,702
Hoisting machinery, cranes, trolleys etc (excl mine hoists)	23,300	29,112	38,075
Rock drilling, earth boring & related machinery	28,751	32,799	35,806
Construction, excavating, dredging & loading equipment	35,324	54,641	77,038
Turbines, hydraulic and steam	24,174	20,745	17,756
Diesel, gas turbine and steam	4,769	1,870	3,866
Gasoline engines, incl outboard, industrial etc	35,825	54,251	48,903
Fire fighting equipment	7,658	8,435	9,414
Baker's machinery	10,453	10,356	11,409
Metalworking machinery excl machine tools	23,648	25,575	17,728
Pulp & paper industries machinery & parts	42,890	41,072	64,142
Service industry equipment	16,056	17,567	18,761
Bearings, ball and roller, and parts	21,746	26,661	31,374
Other transmission machinery & parts	16,805	16,747	18,622
Water and sewage treatment equipment	6,995	7,758	10,441
Industrial heat exchangers	6,002	5,576	10,348

Appendix 5 (cont'd)

	'000 Canadian Dollars		
	1963	1964	1965
Ventilating, exhaust & dust collecting equipment	18,694	21,274	25,787
Welding machinery, electric	5,565	6,597	6,624
Power lawn mowers	9,229	11,562	11,935
Oil burners, power, domestic, commercial and industrial	7,446	7,589	7,712
Power tools, hobby and home workshop	7,148	9,459	11,233
Saws, power, chain and parts	14,068	19,309	19,485
Typewriters, electric	9,360	11,791	15,608
Typewriters, other	7,643	8,601	8,911
Sub-total ..	498,899	589,042	686,102
TRANSPORTATION INDUSTRIES			
Automobiles	1,148,706	1,233,762	1,561,154
Trucks	226,277	273,542	328,664
Buses	12,536	22,812	30,150
Trailers	38,118	54,170	66,319
Railway cars	30,135	48,075	110,962
Ship building and repairs	173,334	173,059	187,713
Boat building	18,943	20,335	22,957
Sub-total ..	1,648,049	1,825,755	2,307,919
ELECTRICAL INDUSTRIES			
Electric vacuum cleaners and parts	11,933	13,022	13,085
Domestic water-tank heaters	20,449	21,592	19,951
Floor polishers	5,004	5,223	5,109
Hair dryers, electric, domestic	8,899	5,814	4,573
Mechanical refrigerators, household	50,016	55,583	58,909
Home freezers	22,404	23,304	23,067
Domestic washing machines	40,351	46,347	51,898
Clothes dryers, automatic	17,646	17,318	20,590
Radio receiver sets, complete	42,488	46,937	54,711
Television sets	69,198	81,659	77,748
Broadcast studio equipment	5,230	7,300	10,437
Radar equipment, commercial and defence	25,920	24,475	10,544
Sonar equipment, commercial and defence	9,223	8,680	9,129
Airborne navigational equipment	52,306	51,994	68,343
Telephone materials incl switchboards, telephone, transmitters	115,733	125,014	134,017

Appendix 5 (cont'd)

	'000 Canadian Dollars		
	1963	1964	1965
Electric generators and parts	15,633	16,061	15,155
Electric motors and parts	54,039	75,510	79,496
Transformers	83,836	87,502	100,272
Electric switchgear & protective equipment (except telephone switchboards)	66,721	73,032	86,975
Electric welding apparatus	5,560	7,037	7,084
Welding rod, electric	12,230	14,279	15,944
Industrial control equipment	32,338	38,834	46,141
Cutouts and fuses	5,761	5,[illegible]	[illegible],176
Pole line hardware	12,642	13,823	15,533
Watt hour meters	6,325	7,063	7,390
Dry cell batteries	11,986	12,806	14,345
Electric storage batteries	32,880	36,244	40,073
Electric wire and cables	181,583	212,330	250,656
Rigid circuits	10,958	12,008	12,098
Incandescent electric lamps	18,827	18,643	19,719
Fluorescent electric lamps	10,756	12,647	14,308
Electric lighting fixtures	59,940	61,[illegible]80	72,863
Sub-Total ..	1,118,815	1,237,200	1,373,343
MISCELLANEOUS			
Metal office furniture	22,569	28,595	34,318
TOTAL OF ABOVE ITEMS	4,506,718	5,071,367	5,995,046

Source: "Metalworking in Canada", A Market Analysis conducted for Canadian Machinery and Metalworking, Maclean-Hunter Research Bureau, August 1968. Taken from Canadian Dominion Bureau of Statistics.

Appendix 6

Size of Metalworking Plants in Canada by Number of Employees and Factory Shipments 1965

	NUMBER OF PLANTS						
	Primary Metal	Metal Fab	Machinery Ind.	Transp Equip	Elec Products	Misc Ind	Total
TOTAL	401	3,581	684	770	595	473	6,504
EMPLOYEES PER PLANT							
Under 50	229	3,010	470	552	315	407	4,983
50-99	64	285	85	62	91	34	621
100-199	51	160	52	67	58	18	406
200-499	24	87	55	42	79	8	295
500 & over	33	39	22	47	52	6	199
FACTORY SHIPMENTS ($ Canadian per annum)							
Under $25,000	37	533	37	152	23	130	912
$25,000 - 99,999	53	1,081	90	165	69	142	1,600
$100,000 - 499,999	110	1,157	268	187	166	128	2,016
$500,000 - 999,999	39	340	79	76	85	29	648
$1,000,000 & over	162	470	210	190	252	44	1,328

Source: "Metalworking in Canada", A Market Analysis conducted for Canadian Machinery and Metalworking, Maclean-Hunter Research Bureau, August 1968. Taken from Canadian Dominion Bureau of Statistics.

Appendix 7

Capital Expenditures on Production Machinery and Equipment by the Canadian Metalworking Industries : 1950 - 1968

	Year	Canadian $ Million
EXPENDITURES BY ALL METALWORKING INDUSTRIES	1950	171.7
	1951	244.4
	1952	310.4
	1953	343.2
	1954	306.5
	1955	324.9
	1956	439.7
	1957	477.7
	1958	375.3
	1959	446.7
	1960	451.4
	1961	409.3
	1962	524.6
	1963	554.0
	1964	741.9
	1965	865.8
	1966	1,057.8
	1967	935.2

Source: "Metalworking in Canada", A Market Analysis conducted by Canadian Machinery and Metalworking Maclean-Hunter Research Bureau, August 1968.

Appendix 8

New Metalworking Production Plants
1958 - 1967

	NUMBER OF NEW METALWORKING PLANTS					
	Primary Metal	Metal Fab	Machinery Ind	Transp Equip	Elect Prods	Total
Total 1958-67	162	2,083	470	550	288	3,553
ANNUAL TOTALS						
1958	11	127	11	23	23	195
1959	13	165	26	38	15	257
1960	18	133	35	29	30	245
1961	17	163	51	34	22	287
1962	10	187	46	53	27	323
1963	27	289	90	69	41	516
1964	11	268	57	83	36	455
1965	18	298	65	80	42	503
1966	20	251	58	67	34	430
1967	17	202	31	74	18	342
COUNTRY AFFILIATION						
U.K.	3	11	9	4	3	30
U.S.A.	13	115	96	61	82	367
Other Foreign	2	7	8	5	5	27
Canada	144	1,950	357	480	198	3,129
LOCATION						
Maritimes	5	53	5	55	5	123
Quebec	41	489	86	87	75	778
Ontario	75	1,081	257	208	165	1,786
Prairies	21	227	71	85	23	427
British Columbia	20	233	51	115	20	439

Source: "Metalworking in Canada", A Market Analysis conducted for Canadian Machinery and Metalworking, Maclean-Hunter Research Bureau, August 1968. Taken from Canadian Dominion Bureau of Statistics.

Appendix - 9

Canadian Market : Inventory : Boring Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Boring machines - total	4,882	1,838	1,313
Horizontal boring, drilling and milling machines spindle under 4"	1,336	583	306
Horizontal boring, drilling and milling machines spindle 4" and over	677	235	217
Vertical boring mills (includes vertical turret lathes) under 12'	1,177	267	511
Vertical boring mills (includes vertical turret lathes) 12' and over	514	161	132
Boring machines, precision, horizontal and vertical	463	235	57
Jig borers, horizontal and vertical	517	253	99
Other boring machines	236	104	17

Canadian Market : Investory : Broaching Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Broaching machines - total	876	304	174
Broaching machines, internal, horizontal or vertical	577	180	159
Broaching machines, surface, horizontal or vertical	265	107	13
Broaching machines, rotary and other	34	17	2

Canadian Market : Inventory : Contour Sawing and Filling Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Cortour Sawing and Filling Machines - total	1,831	953	165

Canadian Market : Inventory : Cutoff Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Cutoff machines - total	14,287	8,218	1,534
Bandsaws	5,610	3,415	498
Abrasive disc cutoff machines	1,911	1,166	149
Hacksaws	3,285	1,348	651
Circular saws	2,730	1,799	191
Other Cutoff machines (including friction)	751	490	95

Appendix 9 (cont'd)

Canadian Market : Inventory : Drilling Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Drilling machines - total	27,253	12,107	5,145
Sensitive drilling machines	1,833	919	270
Upright, single spindle drilling machines	16,905	7,488	2,905
Upright, gang drilling machines	2,070	643	546
Upright, turret drilling machines	376	318	6
*Radial drilling machines	3,454	1,372	871
Drilling machines, cluster, adjustable and fixed centre	524	250	128
Drilling machines, unit head and way, multi-spindle	817	253	243
Deep hole drilling machines (including gun drills)	399	284	52
Other drilling machines	1,497	907	224

Canadian Market : Inventory : Electrical Machining Units

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Electrical machining units - total	435	368	5
Electrical discharge machines (EIM)	270	236	-
Other electrical machining units (includes disintegrators, ECM and ultrasonic)	165	132	5

Canadian Market : Inventory : Gear Cutting Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Gear cutting machines - total	1,477	443	423
Gear hobbers	698	192	174
Gear shapers	305	82	100
Form milling type gear cutters	182	49	79
Bevel gear cutters (includes planer)	128	49	25
Gear tooth finishers (grind, lap, shave)	73	24	15
Other gear cutting & finishing machines	101	47	30

Appendix 9 (cont'd)

Canadian Market : Inventory : Grinding Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Grinding machines - total	25,305	11,416	4,501
External cylindrical (plain and universal)	2,679	1,104	647
Internal cylindrical grinding machines	786	262	209
Centreless grinders, int. & ext.	528	161	87
Surface, rotary table type grinding machines	828	408	129
Surface, reciprocating table grinding machines	3,873	1,746	652
Disc, horizontal and vertical grinding machines	1,744	1,207	160
Tool and cutter grinding machines	3,550	1,494	746
Bench, floorstand and saag grinders	8,886	3,698	1,780
Abrasive belt (not polishing) machines	2,014	1,118	118
Contour grinding machines	160	94	28
Thread grinding machines	184	83	35

Canadian Market : Inventory : Honing, Lapping Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Honing, lapping machines - total	1,463	800	103
Honing machines, internal	979	536	63
Honing machines, external	90	53	-
Lapping machines, cylindrical	161	74	26
Lapping machines, surface	253	137	14

Canadian Market : Inventory : Lathes

(Number of machines)

	1968 Inventory			
	Total	Under 10 years		Over 20 years
Lathes - total	26,254	9,440		6,863
*(Bench and floor lathes, light duty	4,684	1,722)	4,825	903
*(Lathes, engine, toolroom, mfg., (copy gap under 20" swing	7,963	3,103)		2,126
Lathes, engine, toolroom, mfg., copy gap 20" swing and over	3,823	1,233		1,505
*(Turret lathes, ram type	2,055	641)	1,451	524
*(Turret lathes, saddle type (capstan)	2,967	810)		866
(Lathes, auto chucking, horizontal (and vertical	890	490		101
(Automatic lathes between centres	275	74		42
(Automatic screw machines (single spindle)	2,056	835		380
(Automatic bar machines (multi-spindle)	1,017	362		244
Other lathes (except spinning)	524	170		172

Canadian Market : Inventory : Milling Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Milling machines - total	13,134	5,861	3,006
Bench type milling machines (hand and power)	839	413	163
Hand milling machines	732	258	229
*Milling machines, knee or bed horizontal, Nos. 1 & 2	3,585	1,196	1,107
Milling machines, knee or bed horizontal, No. 3 and larger	1,856	660	515
Milling machines, automatic & manufacturing	644	341	103
*Milling machines, vertical, Nos. 1 & 2	2,735	1,664	354
Milling machines, vertical, No. 3 and larger	965	405	220
Planer type milling machines	238	40	88
Die sinkers & duplicators (except engraving)	570	363	70
Thread milling machines	130	30	53
Milling machines, other (including routers, engravers)	840	491	104

Canadian Market : Inventory : Planers

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Planers - total	1,148	150	723
Double housing planers	588	41	441
Openside planers	358	56	177
Other planers	202	53	105

Canadian Market : Inventory : Pipe Cutting, Threading Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Pipe cutters, threading machines - total	2,258	1,130	271

Canadian Market : Inventory : Polishing, Buffing Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Polishing and buffing machines - total	5,687	2,623	886
Polishing stands	3,023	1,080	630
Abrasive belt machines	2,092	1,196	206
Other polishing & buffing machines (including speed lathes)	572	347	50

Canadian Market : Inventory : Shapers

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Shapers - total	3,510	651	1,288
Horizontal shapers	2,971	578	995
Vertical shapers (including alotters, key-seaters)	579	89	303

Canadian Market : Inventory : Threading Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Threading machines (except rolling and pipe) - total	2,491	912	640
Tapping machines	1,263	526	247
Thread hobbing machines	92	30	9
Die type threading machines	843	268	282
Other threading machines	231	77	73

Canadian Market : Inventory : Multi-function Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Multi-function machines - total	1,479	1,042	102
Drill, mill, bore machines	375	218	40
Way type, single station machines	116	88	4
Multi-station, trunnion, centre column machines	117	73	15
Transfer, plain or pallet machines	130	133	-
Automatic assembly machines	376	260	13
Other multi-function machines	359	270	30

Appendix 9 (cont'd)

Canadian Market : Inventory : Other Metal Cutting Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Other metal cutting machines - total	1,284	717	210

Appendix 9 (cont'd)

Canadian Market : Inventory : Bending and Forming Machines (Power)

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Bending and forming machines (power) - total	8,555	3,811	1,588
Bending rolls, sheet and plate	2,084	636	659
Bending rolls, bar, pipe, shape	924	454	153
Roll forming machines	1,101	530	133
Press brakes, folders	3,271	1,761	384
Spinning lathes (includes roll flowing)	483	140	146
Other bending and forming machines	659	259	113

Canadian Market : Inventory : Hydraulic Presses

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Hydraulic presses - total	4,495	2,298	566
Vertical single acting hydraulic presses	2,992	1,446	352
Vertical double, triple acting hydraulic presses	604	315	77
Horizontal hydraulic presses (includes extruders)	449	214	123
Other hydraulic presses (includes hydro-pneumatic)	450	323	14

Appendix 9 (cont'd)

Canadian Market : Inventory : Pneumatic Presses (except hydro-pneumatic)

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Pneumatic presses (except hydro-pneumatic) - total	1,612	717	248

Canadian Market : Inventory : Mechanical Presses (power)

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Mechanical presses (power) - total	18,971	6,495	4,795
Inclinable (OBI) mechanical presses	10,347	3,561	2,423
Vertical, C-frame mechanical presses	3,404	1,208	859
Vertical, straight-side mechanical presses	3,751	1,125	1,055
Dieing machines	354	130	74
Horizontal mechanical presses	237	63	115
Other mechanical presses	886	408	277

Canadian Market : Inventory : High Energy Presses (HERF)

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
High Energy Presses (HERF) - total	51	40	-

Canadian Market : Inventory : Punching and Shearing Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Punching and Shearing Machines - total	9,859	3,949	2,572
Punching machines	2,997	1,254	849
Plate and sheet shears	3,102	1,188	728
Bar and angle shears	1,195	395	463
Rotary shears (includes slitters)	642	202	177
Ironworkers (punch-shear)	1,118	579	193
Other punching and shearing machines	581	251	129

Canadian Market : Inventory : Thread Rolling Machines

(Number of machines)

	1968 Inventory		
	Total	Under 10 years	Over 20 years
Thread rolling machines - total	611	262	75

Source: Canadian Machinery and Metalworking, July, 1968.

Appendix - 17

Canadian Inventory of Machine Tools, by End User and Age, 1968

	Age 10 Yrs & under	 Over 20 Yrs	Total
Total	81,114	39,197	190,284
Metal Cutting Machines, All Types	60,517	27,537	137,559
Iron, steel, pipe, tube, mills	1,501	1,062	4,185
Iron foundries	660	588	2,289
Smelting & refining	176	937	1,718
Rolling, casting, extruding	2,304	200	3,564
Boiler, platework, heating equipment	1,479	359	2,872
Structural, ornamental, architectural	4,268	1,654	7,983
Stamping, pressing, furniture	3,450	1,018	6,962
Wire and wire products	2,871	787	5,793
Hardware, tools, cutlery	6,007	1,044	10,240
Machine shops	7,436	3,026	15,952
Miscellaneous metal fabricating	2,856	2,418	7,970
Agricultural implements	1,058	1,146	3,396
Machinery, other, non-electrical	6,670	4,049	18,714
Aircraft & parts	1,644	909	4,740
Motor vehicle, truck body & trailor	1,621	839	3,401
Motor vehicle parts & accessories	3,449	648	6,763
Ship and boatbuilding & repair	1,491	1,376	3,097
Misc vehicle incl. railroad	558	705	1,638
Appliances, electrical & non-electrical	592	1,024	3,352
Radio, TV, Communications equipment	3,708	647	6,458
Industrial electrical equipment	1,546	740	4,042
Other electrical incl wire, battery	1,068	483	2,413
Instruments & related products	1,818	272	3,121
All other, incl metal wholesalers	2,286	1,606	5,996

Appendix 10 (cont'd)

	Age		
	10 Yrs & under	Over 20 Yrs	Total
Metal Forming Machines, All Types	20,597	11,610	52,285
Iron, steel, pipe, tube, mills	291	502	1,115
Iron foundries	111	52	335
Smelting & refining	-	319	469
Rolling, casting, extruding	568	100	1,075
Boiler, platework, heating equipment	595	163	1,323
Structural, ornamental, architectural	2,128	934	4,404
Stamping, pressing, furniture	2,813	2,009	7,930
Wire & wire products	1,554	799	3,640
Hardware, tools, cutlery	939	338	2,116
Machine shops	872	330	1,949
Miscellaneous metal fabricating	846	492	2,140
Agricultural implements	428	615	1,495
Machinery, other, non-electrical	1,424	678	3,447
Aircraft & parts	267	292	1,187
Motor vehicle, truck body & trailor	665	376	1,573
Motor vehicle parts & accessories	2,042	427	4,446
Ship & boatbuilding & repair	190	383	786
Miscellaneous vehicle including railroad	100	156	320
Appliances, electrical & non-electrical	495	609	2,323
Radio, TV, Communications equipment	1,174	386	2,519
Industrial electrical equipment	602	525	1,900
Other electrical including wire, battery	707	259	1,554
Instruments & related products	298	25	546
All other, incl. metal wholesalers	1,488	805	3,663

Source: Canadian Machinery and Metalworking, July, 1968

Appendix - 11

Machine Tools in One Canadian Vocational School

Filing and Sawing machine	Eliot, No.4
Jig Saw	Ex-Cell-O
Vertical Pillar Drill	Eliot ½"
Electro Discharge Machine	
Vertical Milling Machine	
Vertical Plane Miller	SIP
Optical Comparator	Jones & Lamson
Shapers, 8" and 14" (2 Nos)	
Lathes 8" x 24", 4" x 12", 17" x 36"	
Horizontal Milling Machine	
Medium Size Lathes (11 Nos)	
Punch Press, 40T	
DoAll Bandsaw	
Plane Shaper Openside	Investa 7
Large Lathe	
Radial Drill 1½"	
Boring Machine	
Bench drill	
Horz Milling Machines (2 Nos)	
Vert Milling Machine (1 No)	
Turrent Lathe (1 No)	
Surface grinders (2 Nos)	
Tool Grinders (2 Nos)	
Tool & Cutter Grinders (3 Nos)	

Canadian Imports of Metalworking Machine Tools 1964-1967
(Value in $ U.S.)

Type of Machine Tools & Country from which Imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Boring, Drilling Machinery and Parts (52303)												
U.K.	185	954,041	5,157	221	973,012	4,403	268	1,646,244	6,143	220	1,371,578	6,254
Austria	3	5,531	1,844	4	7,197	1,799	4	15,696	3,924	3	6,461	2,154
Belgium-Lux.	2	26,198	13,099	5	173,841	34,762	1	42,472	42,472	3	93,225	31,074
Denmark	2	7,977	3,989	5	14,618	2,924	12	16,619	1,385	11	26,767	2,433
France	8	106,352	13,294	1	400	400	7	3,693	528	3	359,047	119,682
West Germany	61	125,819	2,063	85	202,086	2,377	90	342,544	3,806	128	304,590	2,380
Italy	30	93,372	3,112	71	262,035	3,691	115	504,122	4,383	124	582,413	4,697
Netherlands	2	15,077	7,539	-	-	-	-	25,852	-	-	2,769	-
Portugal	5	3,902	780	4	1,678	420	4	2,770	692	7	5,538	791
Spain	5	5,126	1,025	3	1,630	543	5	5,540	1,108	29	26,767	923
Sweden	244	143,997	590	198	139,682	705	219	104,333	476	407	225,366	549
Switzerland	3	49,830	16,610	15	87,356	5,824	25	69,248	2,770	3	29,536	9,845
Czechoslovakia	43	136,601	3,177	56	113,613	2,029	81	157,884	1,949	64	397,813	6,216
Poland	18	37,015	2,056	48	87,728	1,828	23	99,716	4,335	31	110,760	3,573
Japan	112	45,205	404	4	13,432	3,358	244	80,327	329	585	258,440	442
Australia	2	1,209	605	-	-	-	2	2,770	1,385	1	1,846	1,846
United States	1,152	5,010,708	4,350	928	5,602,920	6,038	982	4,892,567	4,982	920	4,594,403	4,777
USSR	-	-	-	4	13,432	3,358	1	6,463	6,463	8	144,911	18,114
India	-	-	-	-	-	-	1	923	923	-	-	-
Yugoslavia	-	-	-	-	-	-	1	15,696	15,696	1	22,152	22,152
East Germany	-	-	-	-	-	-	3	11,080	3,660	11	33,228	3,021
Hungary	-	-	-	-	-	-	-	-	-	3	10,153	3,384
Argentina	-	-	-	-	-	-	-	-	-	1	923	923
Total	1,877	6,766,961	3,605	1,902	7,788,499	4,094	2,088	8,047,483	3,854	2,563	8,339,305	3,254

Appendix - 12

Type of Machine Tools & Country from which Imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Grinding Machines and Parts (52305)												
U.K.	538	1,113,206	2,069	673	1,565,760	2,324	575	1,732,111	3,299	675	2,202,278	3,263
Austria	2	1,701	851	-	-	-	-	-	-	-	-	-
Belgium-Lux.	1	4,017	4,017	1	4,560	4,560	-	-	-	2	4,615	2,307
Denmark	27	99,250	3,676	35	106,894	3,059	57	154,191	2,705	113	269,516	2,385
France	10	6,287	629	-	-	-	47	18,446	392	17	29,536	1,737
West Germany	186	680,102	3,656	673	456,080	678	972	591,835	609	563	696,855	1,238
Italy	45	156,653	3,481	63	169,033	2,683	73	155,114	2,125	112	187,369	1,673
Netherlands	18	192,202	10,678	22	190,582	8,668	18	227,132	12,618	9	105,222	11,691
Spain	3	3,305	1,101	5	9,214	1,843	5	12,003	2,401	40	85,839	2,146
Sweden	54	181,191	3,355	48	242,871	5,059	93	168,041	1,807	106	157,833	1,489
Switzerland	49	153,126	3,125	133	133,851	1,006	140	90,485	646	76	281,515	3,704
Czechoslovakia	21	61,939	2,949	40	98,211	2,455	26	80,327	3,090	37	112,606	3,043
Japan	13	34,175	2,629	213	83,554	392	190	120,952	637	229	172,601	754
Australia	23	19,618	853	5	1,930	386	200	12,926	65	26	11,999	462
Puerto Rico	1	482	482	-	-	-	-	-	-	-	-	-
United States	6,635	7,037,030	1,061	7,031	11,431,689	1,626	6,417	11,735,143	1,829	5,801	6,290,245	1,084
Poland	-	-	-	-	-	-	1	8,310	8,310	8	28,613	3,577
USSR	-	-	-	-	-	-	190	121	-	6	16	3
Yugoslavia	-	-	-	-	-	-	-	-	-	2	19	10
Republic S. Africa	-	-	-	-	-	-	-	-	-	1	1	1
New Zealand	-	-	-	-	-	-	-	-	-	1	6	6
Total:	7,626	9,743,281	1,278	8,942	14,492,208	1,621	8,765	15,107,035	1,724	7,824	10,678,187	1,365

Type of Machine Tools & Country from which Imported	1964*			1965*			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Lathes, Automatic (52306)												
U.K.							63	1,019,323	16,180	110	2,030,600	18,460
France							1	7,386	7,386	1	3,692	3,692
West Germany							9	57,245	6,361	19	535,340	28,176
Italy							8	139,418	17,427	7	107,991	15,427
Sweden							1	37,855	37,855	-	-	-
Switzerland							6	56,321	9,387	12	250,133	20,844
Japan							2	51,392	15,696	2	29,536	14,768
United States							147	5,909,120	40,198	98	4,049,201	41,318
Belgium-Lux.							-	-	-	1	7,384	7,384
Poland							-	-	-	2	11,076	5,538
Total	..		..		..	..	237	7,257,138	30,621	252	7,025,876	27,880
Lathes, Turret (52307)												
U.K.							54	487,502	9,028	71	562,107	7,917
Austria							5	3,693	739	-	-	-
West Germany							4	28,622	7,150	15	159,679	10,645
Italy							5	48,022	9,604	2	20,306	10,153
Spain							2	1,847	923	2	2,769	1,385
Switzerland							4	29,546	7,386	9	81,224	9,025
Czechoslovakia							9	40,625	4,514	3	20,306	6,769
Poland							1	6,463	6,463	2	9,230	4,615
Japan							20	153,268	7,634	28	220,597	7,878
United States							74	1,179,977	15,946	64	1,060,527	16,571
Belgium-Lux.							-	-	-	5	79,378	15,876
East Germany							-	-	-	1	8,307	8,307
Argentina							-	-	-	3	13,845	4,615
Total	..		..		..	..	178	1,986,018	11,574	208	2,237,352	10,757

* Separate date for 1964 and 1965 not available. Figures included in "Lathes and Parts, 52307.

Appendix 12 (Cont'd)

Type of Machine Tools & Country from which Imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Lathes and Parts, NES (52308)												
U.K.	482	2,046,361	4,247	625	2,582,580	4,132	614	1,824,441	2,971	836	2,348,112	2,809
Austria	166	161,783	975	59	194,465	3,296	93	201,279	2,164	312	190,138	609
Belgium-Lux.	40	137,926	3,448	12	87,943	7,329	29	166,194	5,731	36	119,990	3,333
Denmark	7	16,224	2,318	4	7,068	1,767	7	26,776	3,825	3	16,614	5,538
France	26	138,753	5,337	15	81,593	5,440	41	151,421	3,693	29	177,216	6,111
West Germany	174	1,303,992	7,494	220	1,519,948	6,909	226	1,609,312	7,121	221	1,539,564	6,966
Italy	46	173,274	3,767	90	466,496	5,183	110	571,523	5,196	164	967,304	5,898
Netherlands	8	8,857	1,107	11	16,386	1,490	3	5,540	1,846	33	54,457	16,502
Portugal	1	5,789	5,789	1	3,595	3,595	-	-	-	-	-	-
Spain	40	71,055	1,776	45	85,063	1,890	13	33,239	2,557	37	75,686	2,046
Sweden	23	98,234	4,271	56	176,335	3,149	32	158,808	4,963	43	100,607	2,340
Switzerland	24	48,314	2,013	12	60,350	5,029	20	68,324	3,416	26	97,838	3,763
Czechoslovakia	77	161,797	2,101	92	289,755	3,149	71	190,200	2,679	54	183,677	3,401
Poland	15	35,819	2,388	74	161,337	2,180	60	195,740	3,262	61	218,751	3,586
India	10	8,708	871	6	4,581	764	5	3,693	739	19	22,152	1,166
Japan	78	310,772	3,984	109	475,414	4,362	119	576,139	4,842	192	844,545	4,399
Australia	48	104,157	2,170	42	179,805	4,281	49	102,486	2,092	54	40,612	753
Argentina	1	4,978	4,978	5	21,298	4,260	-	-	-	3	4,615	1,505
Brazil	7	12,386	1,770	2	4,477	2,238	2	3,693	1,847	12	26,767	2,231
Mexico	1	1,319	1,319	1	3,836	3,836	-	-	-	-	-	-
Puerto Rico	3	1,848	616	-	-	-	-	-	-	-	-	-
United States	998	8,058,690	8,075	660	7,718,964	11,695	501	1,918,617	3,830	479	2,652,702	5,538
Bulgaria	-	-	-	7	17,721	2,532	18	54,474	3,026	-	923	-
USSR	-	-	-	10	31,121	3,112	11	52,628	4,784	26	84,916	3,266
Yugoslavia	-	-	-	3	13,583	4,528	14	31,392	2,242	36	147,680	4,102
Norway	-	-	-	-	-	-	1	1,847	1,847	-	-	-
East Germany	-	-	-	-	-	-	-	-	-	3	22,152	7,387
Hungary	-	-	-	-	-	-	-	-	-	2	11,076	5,538
Taiwan	-	-	-	-	-	-	-	-	-	14	5,538	396
Total	2,275	12,909,561	5,675	2,161	14,200,725	6,571	2,039	7,949,613	3,899	2,695	9,954,555	3,694

Type of Machine Tools & Country from which Imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Milling Machines and Parts (52309)												
U.K.	145	1,371,681	9,460	134	1,494,108	11,150	184	1,703,489	9,258	226	2,421,952	10,717
Belgium-Lux.	1	8,033	8,033	3	178,799	59,600	7	156,961	22,423	1	4,615	4,615
Denmark	26	114,166	4,391	31	113,560	3,663	33	132,955	4,029	30	151,372	5,046
France	7	34,578	4,940	8	97,295	12,162	22	175,427	7,973	25	382,122	15,285
West Germany	55	494,545	8,992	114	694,660	6,094	116	1,568,687	13,507	164	2,735,772	16,682
Italy	27	150,211	5,563	98	902,545	9,210	104	623,228	5,993	187	686,712	3,672
Netherlands	1	5,405	5,405	-	621	-	1	10,156	10,156	-	1,846	-
Spain	10	27,934	2,793	14	51,955	3,711	29	72,017	2,483	62	251,056	4,049
Sweden	76	434,388	5,716	88	457,354	5,197	114	691,552	6,066	157	961,766	6,126
Switzerland	20	162,320	8,116	19	222,893	11,731	23	136,648	5,941	39	398,736	10,224
Czechoslovakia	30	94,707	3,157	46	195,025	4,240	77	352,701	4,581	82	419,042	5,110
Poland	8	30,599	3,824	14	53,009	3,786	14	72,941	5,210	7	37,843	5,406
Japan	16	112,879	7,055	61	546,395	8,957	47	629,691	13,397	79	913,770	11,567
Argentina	1	7,323	7,323	5	32,840	6,568	-	-	-	5	26,767	5,353
United States	520	2,965,433	5,703	492	3,725,976	7,573	607	5,633,053	9,280	685	10,574,811	15,438
USSR	-	-	-	1	3,004	3,004	51	183,737	3,603	58	290,745	5,013
Yugoslavia	-	-	-	4	8,208	4,052	-	-	-	9	47,996	5,333
East Germany	-	-	-	-	-	-	4	22,159	5,532	28	216,905	7,747
Hungary	-	-	-	-	-	-	1	923	923	2	12,922	6,461
Philippines	-	-	-	-	-	-	4	67,401	16,850	-	-	-
Mexico	-	-	-	-	-	-	1	58,168	58,158	-	-	-
Total	943	6,014,387	6,378	1,132	8,777,248	7,754	1,439	12,291,893	8,542	1,842	20,221,084	10,978

Type of Machine Tools & Country from which Imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Shapers, Gear Makers and Parts (52321)												
U.K.	58	491,774	8,479	82	877,243	10,698	77	422,871	5,492	63	278,746	4,425
Austria	-	4,317	-	-	-	-	-	-	-	-	-	-
France	3	3,783	1,261	3	3,923	4,641	9	13,849	1,539	6	11,076	1,846
West Germany	13	38,433	2,956	16	50,243	3,140	9	93,253	10,362	11	273,208	24,837
Italy	2	17,284	8,642	2	9,598	4,799	2	12,926	6,463	4	83,993	20,998
Sweden	38	59,092	1,555	38	53,390	1,405	40	59,091	1,477	97	119,067	1,227
Switzerland	8	40,206	5,026	-	1,082	-	3	106,179	35,393	3	52,611	17,535
Czechoslovakia	2	18,509	9,254	3	15,100	5,033	6	60,015	10,002	5	35,074	7,015
Puerto Rico	1	4,793	4,793	-	-	-	-	-	-	-	-	-
United States	287	5,049,924	17,596	191	2,980,026	15,602	221	2,041,416	9,237	132	2,404,415	18,215
USSR	-	-	-	1	871	871	12	21,236	1,769	-	2,769	-
Spain	-	-	-	-	-	-	3	13,850	4,616	4	8,307	2,077
India	-	-	-	-	-	-	1	923	923	-	-	-
Japan	-	-	-	-	-	-	2	19,390	9,695	5	31,382	6,276
Australia	-	-	-	-	-	-	4	1,847	462	2	923	462
Norway	-	-	-	-	-	-	-	-	-	1	923	923
East Germany	-	-	-	-	-	-	-	-	-	1	16,614	16,614
Total	412	5,724,323	13,894	336	3,991,476	11,879	389	2,866,847	7,370	334	3,319,108	9,937

Type of Machine Tools & Country from which Imported	1964*			1965*			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Sawing Machines and Part (52391)												
U.K.								245,598			349,817	
Austria								49,858			48,919	
West Germany								373,015			478,114	
Italy								12,926			11,999	
Spain								2,770			2,769	
Sweden								22,159			18,460	
Switzerland								11,080			15,691	
Czechoslovakia								2,770			923	
Poland								3,693			8,307	
India								923			-	
Japan								44,318			54,457	
Australia								1,847			923	
United States								2,012,794			2,392,416	
France											2,769	
Netherlands											1,846	
Norway											1,846	
USSR-Russia											15,691	
Yugoslavia											9,230	
Total		..		..		..		2,782,826			3,413,254	

Note * Separate date for 1964 and 1965 not available

Type of Machine Tools & Country from which imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Presses and Parts (52315)												
UK	35	213,813	6,480	41	279,127	6,808	37	413,638	11,179	58	721,786	12,444
Belgium-Luxemb	-	1,551	-	-	1,521	-	3	65,554	-	-	1,846	-
Denmark	22	18,552	843	27	14,708	545	50	79,404	1,588	46	17,537	381
West Germany	24	120,165	5,007	29	231,964	8,591	22	198,510	9,023	22	269,516	12,251
Italy	14	29,809	2,129	47	131,109	2,789	63	170,810	2,711	58	1,837,693	31,684
Netherlands	1	12,156	12,156	2	2,252	1,126	11	46,165	4,188	-	923	-
Spain	4	6,137	1,534	4	12,341	3,085	4	14,773	3,693	1	4,615	4,615
Sweden	1	17,995	17,995	9	157,130	17,458	12	16,619	1,385	9	8,307	923
Switzerland	-	1,160	-	1	775	775	2	18,467	9,234	5	27,690	5,538
Puerto Rico	2	5,760	2,780	-	-	-	-	-	-	-	-	-
United States	1,300	6,556,709	5,044	1,197	5,757,692	4,810	1,266	8,129,657	8,422	896	4,941,742	5,515
Czechoslovakia	-	-	-	3	9,926	3,309	7	29,546	4,221	7	19,383	2,769
Japan	-	-	-	6	27,550	4,591	8	108,949	13,619	73	95,069	1,302
Australia	-	-	-	-	-	-	1	7,386	7,386	1	1,846	1,846
USSR	-	2 -	-	-	-	-	4	21,236	5,309	17	72,917	4,289
France	-	-	-	-	-	-	-	923	-	2	3,692	1,846
East Germany	-	-	-	-	-	-	-	-	-	4	23,998	5,999
Israel	-	-	-	-	-	-	-	-	-	13	35,997	2,769
Total ..	1,401	6,982,602	4,984	1,366	6,626,094	4,851	1,490	7,456,571	5,004	1,212	8,084,557	6,670
Rolls, Bending Machinery and Parts (52320)												
UK	-	244,861	-	-	140,185	-	-	300,996	-	-	339,664	-
West Germany	-	66,848	-	-	118,767	-	-	151,421	-	-	50,765	-
Italy	-	3,925	-	-	2,865	-	-	106,179	-	-	77,532	-
Sweden	-	7,709	-	-	3,854	-	-	34,162	-	-	59,072	-
United States	-	2,053,924	-	-	2,243,894	-	-	2,264,855	-	-	2,710,851	-

Type of Machine Tools & Country from which imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Israel	-	-	-	-	4,538	-	-	-	-	-	-	-
Japan	-	-	-	-	7,220	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	923	-	-	-	-
USSR	-	-	-	-	-	-	-	27,670	-	-	923	-
Rep of S. Africa	-	-	-	-	-	-	-	16,619	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-	2,769	-
Switzerland	-	-	-	-	-	-	-	-	-	-	923	-
Australia	-	-	-	-	-	-	-	-	-	-	34,151	-
Total ..	-	2,376,273	-	-	2,520,323	-	-	2,902,855	-	-	3,355,105	-
Shearing Machine & Parts (52327)*												
UK	-	-	-	-	-	-	156	581,679	3,729	124	829,777	6,691
Denmark	-	-	-	-	-	-	15	103,410	6,894	26	179,062	6,887
West Germany	-	-	-	-	-	-	71	76,634	1,079	39	89,531	2,296
Italy	-	-	-	-	-	-	6	12,003	2,000	12	38,766	3,230
Netherlands	-	-	-	-	-	-	11	15,696	1,426	4	16,614	4,153
Spain	-	-	-	-	-	-	28	7,386	264	26	2,769	107
Sweden	-	-	-	-	-	-	8	20,313	2,539	4	11,076	2,769
Switzerland	-	-	-	-	-	-	3	17,543	5,848	8	23,075	2,884
East Germany	-	-	-	-	-	-	1	9,233	9,233	-	-	-
USSR	-	-	-	-	-	-	1	12,926	12,926	1	12,922	12,922
Japan	-	-	-	-	-	-	1	923	923	-	-	-
United States	-	-	-	-	-	-	228	1,299,083	5,698	993	975,611	2,482
Hungary	-	-	-	-	-	-	-	-	-	6	9,230	1,039
Australia	-	-	-	-	-	-	-	-	-	1	7,384	7,384
Total ..	-	-	-	-	-	-	529	2,157,752	4,078	644	2,197,663	3,413

NOTE: * Separate data for 1964 and 1965 not available.

Type of Machine Tools & Country from which imported	1964			1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Machine Tools and Parts Not Elsewhere Specified (52329)												
UK	-	1,422,206	-	-	1,292,768	-	-	1,752,423	-	-	1,486,953	-
Austria	-	3,759	-	-	7,670	-	-	15,696	-	-	31,382	-
Belgium-Luxemb	-	184,835	-	-	5,435	-	-	231,748	-	-	142,142	-
Denmark	-	13,430	-	-	66,528	-	-	4,617	-	-	8,307	-
France	-	38,249	-	-	83,568	-	-	50,782	-	-	47,996	-
West Germany	-	450,912	-	-	667,295	-	-	733,100	-	-	1,036,529	-
Italy	-	295,382	-	-	170,048	-	-	451,494	-	-	184,460	-
Netherlands	-	17,441	-	-	9,669	-	-	14,773	-	-	19,363	-
Norway	-	2,825	-	-	-	-	-	1,847	-	-	923	-
Spain	-	14,880	-	-	19,267	-	-	923	-	-	15,691	-
Sweden	-	98,728	-	-	122,730	-	-	119,106	-	-	141,219	-
Switzerland	-	169,300	-	-	126,891	-	-	223,439	-	-	335,972	-
Czechoslovakia	-	21,996	-	-	22,278	-	-	1,847	-	-	47,996	-
East Germany	-	1,030	-	-	3,747	-	-	3,693	-	-	11,999	-
Poland	-	5,987	-	-	18,447	-	-	3,693	-	-	3,692	-
Japan	-	17,552	-	-	114,187	-	-	103,410	-	-	69,225	-
Australia	-	2,453	-	-	5,278	-	-	4,617	-	-	5,538	-
Puerto Rico	-	664	-	-	1,298	-	-	-	-	-	-	-
United States	-	15,501,977	-	-	26,435,127	-	-	23,467,516	-	-	19,885,112	-
Hungary	-	-	-	-	-	-	-	923	-	-	7,384	-
Rep. S. Africa	-	-	-	-	-	-	-	11,080	-	-	1,846	-
India	-	-	-	-	-	-	-	923	-	-	-	-
USSR	-	-	-	-	-	-	-	-	-	-	5,538	-
Israel	-	-	-	-	-	-	-	-	-	-	1,846	-
Total ..	-	18,263,297	-	-	29,171,971	-	-	27,197,648	-	-	23,490,350	-

Source: Canada Dominion Bureau of Statistics, External Trade Division. Trade of Canada, Imports by Commodities, Catalogue 65-007.

Note to Appendix 12 : Canadian Import Classification for Machine Tools

Metal Boring Drilling Machinery & Parts - 523-03

Boring Machinery, Metalworking & Parts
Drill Presses, Metalworking & Parts
Drilling Machinery, Metalworking & Parts
Drill, Power, Metalworking & Parts

Metal Grinding Machines & Parts - 523-05

Cutoff Machine/Grinder/Metalworking & Parts
Grinders, Metalworking & Parts
Grinders, Valve Seat, Power & Parts
Grinding Machine, Metalworking & Parts
Sparpening Machine, Metalworking & Parts

Lathes, Metalworking, Automatic - 523-06

Lathes, Chucking, Automatic

Lathes, Metalworking, Turret NES - 523-07

Lathes, Metalworking & Parts NES - 523-08

Metal Milling Machines & Parts - 523-09

Boring-Drilling-Milling Machines Metalwork=ng
Die-Sinking Machines, Milling
Drilling-Boring-Milling Machine, Metalworking
Milling-Drilling-Boring Machine, Metalworking
Milling Machinery, Metalworking & Parts
Profiling Machine, Metalworking & Parts

Presses, Metalworking & Parts - 523-15

Bliss Auto Strip Feed Press
Dimpler, Metalworking
Forging Press, Hydraulic
Presses, Forging, Hydraulic
Presses, Horning, Metalworking & Parts
Presses, Lead Encasing, Metalworking
Presses, Punch, Metalworking & Parts
Presses, Toledo, Metalworking & Parts

Rolls, Bending Machine, Metalworking & Parts - 523-20

Bending, Bar, Metalworking Machine & Parts
Bending Machinery, Metalworking & Parts
Bending, Rolls, Metalworking Machine & Parts
Brake, Mechanical, Metalworking & Parts
Brakes, Press, Metalworking
Straightening Machine, Metalworking
Straightening, Rolls, Metalworking Machine & Parts
Witney-Jensen Brake

Shapers, Gear Makers, Metalworking &)arts - 523-21

Cutting Machine, Gear, Metalworking & Parts

Shapers, Gear Makers, Metalworking & Parts (cont'd) - 523-21

- Do-All Metal Master
- Gear Cutting Machine, Metalworking & Parts
- Gear Generators & Parts
- Gear Grinding Machine, Metalworking & Parts
- Gear Hobbing Machine, Metalworking & Parts
- Grinders, Gear, Metalworking & Parts
- Hobbing Machine, Gear, Metalworking & Parts
- Keyseating Machinery
- Shapers, Metalworking & Parts
- Slotters, Metalworking & Parts

Shearing Machine, Metalworking & Parts - 523-27

- Guillotines, Metalcutting

Transfer Machines, Metalworking & Parts - 523-28

Machine Tools, Metalworking & Parts NES - 523-29

- Bending Machine, Conduit & Parts
- Broaching Machine, Metalworking & Parts
- Chucks for Metalworking Machinery
- Combination Machine Tool Units NES
- Conduit Bending Machines
- Countersink Machine, Metalworking & Parts
- Die-Sinking Machines NES
- Embossing Machine, Metalworking & Parts
- Extruding Machine, Metalworking
- Holders, Tool for Metalworking Machine Tools
- Honing Machines, Metalworking
- Ironworkers, Universal
- Lock Forming Machine
- Mandrels for Lathes
- Pantographs for Machine Tools
- Pipe Threading Machinery
- Planers, Metalworking & Parts
- Polishing Machines, Metalworking
- Presses, Extrusion, Metalworking
- Punching Machines, Metalworking & Parts

- Reaming Machines, Metalworking & Parts
- Riveting Machines & Parts
- Routers, Metalworking & Parts
- Screw Making Machine, Metalworking & Parts
- Swagers
- Tapping Machines, Metalworking & Parts
- Thread Rollers, Metalworking & Parts
- Threadcutting Machines & Parts
- Threading Machine, Pipe, Metalworking & Parts
- Tracer Duplicator, Metalworking
- Universal Iron Workers

Sawing Machines, Metal Cutting & Parts - 523-91

- Blades, Band Saw, Metalworking
- Blades, Circular Saw, Metalworking
- Blades, Hacksaw, Power
- Saws, Band, Metalworking & Parts
- Saws, Circular, Metalworking & Parts
- Saws, Hack, Power & Parts
- Saws, Rail

Canadian Market : Imports from the U.S : Boring Machines

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Boring-drilling-milling machines, horizontal	64	2,211,896	34,561	88	2,159,902	37,748		1,760,304	
Vertical boring mills, incl. vert. turret	50	759,495	15,190	32	968,068	30,252		1,442,339	
Precision & jig boring machines	11	91,965	8,360	59	374,235	6,343		158,933	
Total:	125	3,063,356	24,507	179	3,502,205	19,565		3,361,576	

Appendix 13 (cont'd)

Canadian Market : Imports from the U.S. : Drilling Machines

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Drilling machines, vertical	483	712,974	1,476	1101	757,408	688		847,213	
Drilling machines, multi-spindle	31	323,126	10,423	21	225,617	10,743		442,601	
Drilling machines, radial	13	109,103	8,393	5	47,967	9,519		235,334	
Drilling machines, not elsewhere classified	65	413,612	6,363	98	474,593	4,843		458,099	
Total:	592	1,558,815	2,633	1225	1,505,585	1,229		1,983,247	

Canadian Market : Imports from the U.S : Machine Tools for Cutting, Hobbing and Finishing Gears

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Gear hobbing machines	14	72,643	5,189	8	288,659	36,082		62,000	
Gear tooth grinding & finishing machines	74	1,205,522	16,291	38	492,772	12,968		1,516,129	
Gear cutting machines, not elsewhere classified	38	600,658	15,806	12	160,092	13,341		482,594	
Total:	126	1,878,823	14,911	58	941,523	16,233		2,060,723	

Canadian Market : Imports from the U.S : Grinding, Honing, Lapping, and Polishing Machines

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Grinders, external cylindrical	198	4,226,602	21,346	86	4,921,523	57,227		1,358,388	
Grinders, internal cylindrical	17	473,211	27,836	15	635,922	42,394		374,414	
Grinders, surface	154	1,734,503	11,263	182	1,254,868	6,895		721,426	
Grinders, tool and cutter	331	900,015	2,719	319	939,406	2,945		614,989	
Polishing and buffing machines	324	389,522	1,202	371	608,449	1,640		451,585	
Honing and lapping machines	140	913,348	6,524	416	1,275,039	3,065		477,729	
Grinding and polishing machines, other	965	1,911,076	1,980	736	2,360,602	321		1,123,762	
Total:	2129	10,548,277	4,955	2124	11,995,808	5,648		5,122,293	

Canadian Market : Imports from the U.S : Lathes

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Lathes, engine	495	477,055	964	623	1,053,255	1,691		778,549	
Lathes, turret, not vertical	32	324,633	10,144	48	365,645	7,617		804,976	
Lathes, auto chucking, single-spindle	45	1,509,399	33,542	69	1,796,960	26,043		1,815,146	
Lathes, auto chucking, multi-spindle	15	745,877	49,725	25	926,863	37,075		530,971	
Automatic screw machines	51	1,475,410	28.949	72	1,723,501	23,938		1,345,349	
Lathes, not elsewhere classified	54	250,546	4,640	117	467,125	3,992		348,228	
Total:	692	4,782,920	6,912	954	6,333,349	6,639		4,623,219	

Canadian Market : Imports from the U.S : Milling Machines

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Milling machines, knee type	104	449,239	4,320	141	736,674	5,225		1,126,887	
Milling machines, bed type	12	316,350	26,363	12	359,473	27,652		1,332,578	
Milling machine, profile dupl., diesink	41	810,695	19,773	41	359,815	8,776		1,522,153	
Milling machines not elsewhere classified	20	337,134	19,857	38	762,544	20,067		1,061,363	
Total:	177	1,597,584	9,025	233	2,218,506	9,521		5,042,981	

Canadian Market : Imports from the U.S : Broaching Machines

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Broaching machines	46	1,382,422	30,053	72	1,560,225	21,670		549,143	

Appendix 13 (cont'd)

Canadian Market : Imports from the U.S : Planing, Shaping, Slotting and Cutoff Machines

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Planers, not gear	7	68,500	9,786	8	69,550	8,688		49,309	
Shapers, slotters	92	512,967	5,576	51	82,746	1,622		102,576	
Sawing and cutoff machines	650	1,288,257	1,982	1,003	1,497,735	1,493		1,869,709	
Total:	749	1,869,721	2.496	1,062	1,650,031	1,554		2,021,594	

Canadian Market : Imports from the U.S : Punching, Shearing, Bending

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Punching and shearing machines	363	1,257,931	3,465	669	1,193,509	1,784		1,073,303	
Bending and forming machines	816	2,377,233	2,913	888	3,014,211	3,394		2,798,686	
Total:	1,179	3,635,164	3,083	1,557	4,207,720	2,702		3,871,989	

Canadian Market : Imports from the U.S : Presses

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Hydraulic and pneumatic presses	443	2,637,115	5,953	716	2,484,826	3,470		2,125,036	
Mechanical and manual presses	418	2,734,954	6,343	697	3,036,917	4,357		1,670,826	
Total:	861	5,372,069	6,239	1,413	5,521,743	3,908		3,795,862	

Canadian Market : Imports from the U.S : Miscellaneous

(All value in US $)

	1965			1966			1967		
	Number	Value	Average value	Number	Value	Average value	Number	Value	Average value
Tapping machines	48	175,999	3,667	55	187,477	3,409		403,058	
Threading machines	247	289,706	1,173	332	235,757	710		195,445	
Multistation machines	95	12,224,564	128,670	92	6,921,159	75,229		3,642,475	
Metal cutting machine tools, not elsewhere classified	739	1,551,922	2,100	1,051	1,493,218	1,402		1,091,424	
Forging machines (not presses)	100	829,769	8,298	94	1,280,078	13,618		1,012,155	
Metal forming machines, not elsewhere classified	1,396	4,045,469	2,898	2,300	6,025,399	2,620		4,526,845	
Total:	2,652	19,117,419	7,209	3,924	16,143,088	4,114		10,871,402	

Appendix - 14

CANADIAN MARKET : IMPORTS FROM ITALY : MACHINE TOOLS BY TYPE

Type of Machine Tools	1964 No.	1964 Value US $	1964 Average US $	1965 No.	1965 Value US $	1965 Average US $	1966 No.	1966 Value US $	1966 Average US $	1967 No.	1967 Value US $	1967 Average US $
Boring, Drilling Machinery and parts	30	93372	3112	71	262033	3691	115	504122	4380	124	582413	4697
Forging, Stamping Machinery and parts	1	709	709	-	-	-	1	3693	3693	-	-	-
Grinding Machinery and parts	45	156653	3481	63	169033	2683	73	155114	2125	112	187369	1673
Lathes, automatic	-	-	-	-	-	-	8	139418	17427	7	107991	15427
Lathes, Turret, n.e.s.	-	-	-	-	-	-	5	48022	9604	2	20306	10153
Lathes and parts	46	173274	3767	90	466496	5183	110	571523	5196	164	967304	5898
Milling Machines and parts	27	150211	5563	98	902545	9210	104	623228	5993	187	686712	3672
Presses and parts	14	29809	2129	47	131109	2789	63	170810	2711	58	1837693	31684
Rolls, Bending Machinery and parts	NA	3925	-	NA	2865	-	NA	106179	-	NA	77532	-
Shapers, Gear makers and parts	2	17284	8642	2	9598	4799	2	12926	6463	4	83993	20998
Shearing Machinery and parts	-	-	-	-	-	-	6	12003	2000	12	38766	3230
Machine Tools and parts n.e.s.	NA	295382	-	NA	170048	-	NA	451494	-	NA	184460	-
Sawing Machines and parts	-	-	-	-	-	-	NA	12926	-	NA	11999	-
			*			*			*			*
Total	165	920619	3765	371	2114727	5234	487	2811458	4601	670	4786538	6735

CANADIAN MARKET : IMPORTS FROM WEST GERMANY : MACHINE TOOLS BY TYPE

Type of Machine Tools	1964			1965			1966			1967		
	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $
Boring, Drilling Machinery and parts	61	125819	2063	85	202086	2377	90	342544	3806	128	304590	2380
Forging, stamping Machinery and parts	5	61176	12235	10	260268	26027	5	125569	25114	4	56303	14076
Grinding Machines and Parts	186	680102	3656	673	456080	678	972	591835	609	563	696855	1238
Lathes, automatic	-	-	-	-	-	-	9	57245	6361	19	535340	28176
Lathes, Turret, N.E.S.	-	-	-	-	-	-	4	28622	7150	15	159679	10645
Lathes and parts	174	1303992	7494	220	1519948	6909	226	1609312	7121	221	1539564	6966
Milling Machines and parts	55	494545	8992	114	694660	6094	116	1568687	13507	164	2735772	16682
Presses and Parts	24	120165	5007	29	231964	8591	22	198510	9023	22	269516	12251
Rolls, Bending Machinery and parts	NA	66848	-	NA	118767	-	NA	151421	-	NA	50765	-
Shapers, Gear makers and parts	13	38433	2965	16	50243	3140	9	93253	10362	11	273208	24837
Shearing Machine and parts	-	-	-	-	-	-	71	76654	1079	39	89531	2296
Machine tools n.e.s.	NA	450912	-	NA	667295	-	NA	733100	-	NA	1036529	-
Sawing Machines and PT	-	-	- *	-	-	-*	NA	373013	-*	NA	478114	-*
Total	518	3341992	5452	1147	4201311	2978	1524	5949745	3079	1186	8225766	5616

CANADIAN MARKET : IMPORTS FROM JAPAN : MACHINE TOOLS BY TYPE

Type of Machine Tools	1964			1965			1966			1967		
	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $
Boring, Drilling Machinery and parts	112	45205	404	4	13432	3358	244	80327	329	585	258440	442
Forging, Stamping Machinery and parts	-	-	-	-	-	-	1	84	84	1	1	1
Grinding Machinery and parts	13	34173	2629	213	83554	392	190	120952	637	229	172601	754
Lathes automatic	-	-	-	-	-	-	2	31392	15696	2	29536	14768
Lathes Turret, n.e.s.	-	-	-	-	-	-	20	153268	7634	28	220597	7878
Lathes and parts	78	310772	3984	109	475414	4362	119	576139	4842	192	844545	4399
Milling machines and parts	16	112879	7055	61	546395	8957	47	629691	13397	79	913770	11567
Presses and parts	-	-	-	6	27550	4591	8	108949	13619	73	95069	1302
Rolls Bending Machines and parts	-	-	-	NA	7220	-	-	-	-	-	-	-
Shapers, Gear makers and parts	-	-	-	-	-	-	2	19390	9695	5	31382	6276
Shearing Machine and parts	-	-	-	-	-	-	1	923	923	-	-	-
Machine Tools and parts n.e.s.	NA	17552	-	NA	114187	-	-	103410	-	NA	69225	-
Sawing Machines and PT	-	-	-	-	-	-	NA	44318	-	NA	54457	-
Total	219	520581	2298*	393	1267752	2917*	634	1868843	2878*	1194	2689623	2149*

Appendix 14 (cont'd)

CANADIAN MARKET : IMPORTS FROM UNITED KINGDOM : MACHINE TOOLS BY TYPE

Type of Machine Tools	1964			1965			1966			1967		
	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $
Boring, Drilling Machinery and parts	185	954041	5157	221	973012	4403	268	1646244	6143	220	1371578	6234
Forging, Stamping Machinery and parts	6	113624	18937	5	107824	21565	9	191123	21236	15	89531	5969
Grinding Machines and parts	538	1113206	2069	673	1563760	2324	525	1732111	3299	675	2202278	3263
Lathes automatic	-	-	-	-	-	-	63	1019323	16180	110	2030600	18460
Lathes Turret, N.E.S.	-	-	-	-	-	-	54	487502	9028	71	562107	7917
Lathes and parts	402	2046861	5092	625	2582580	4132	614	1824441	2971	836	2348112	2809
Milling Machines and parts	145	1371681	9460	134	1494108	11150	184	1703489	9258	226	2421952	10717
Presses and parts	33	213813	6480	41	279127	6808	37	413638	11179	58	721736	12444
Rolls, Bending Machinery and parts	NA	244867	-	NA	140185	-	NA	30096	-	NA	339664	-
Shapers, Gear makers and parts	58	491774	8479	82	877243	10698	77	422871	5492	63	278746	4425
Shearing Mach. and parts	-	-	-	-	-	-	156	581679	3729	124	829777	6691
Machine Tools and parts N.E.S.	NA	1422206	-	NA	1292768	-	NA	1752423	-	NA	1486953	-
Sawing Machines & PT	-	-	-	-	-	-	NA	245598	-	NA	349817	-
Total	1447	7780073	4225*	1781	9310607	4423*	1987	12321438	5044*	2398	34832901	13618*

Appendix 14 (cont'd)

CANADIAN MARKET : IMPORTS FROM SWITZERLAND : MACHINE TOOLS BY TYPE

Type of Machine Tools	1964			1965			1966			1967		
	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $	No.	Value US $	Average US $
Boring, Drilling Machinery and parts	3	49830	16610	15	87356	5824	25	69248	2770	3	29536	9345
Forging, stamping machinery and parts	NA	1278	-	NA	2827	-	NA	5540	-	NA	1846	-
Grinding Machines and parts	49	153126	3125	133	133831	1006	140	90483	646	76	281515	3704
Lathes, automatic	-	-	-	-	-	-	6	56321	9387	12	250133	20844
Lathes Turret N.E.S.	-	-	-	-	-	-	4	29546	7386	9	81224	9025
Lathes and parts	24	48314	2013	12	60350	5029	20	68324	3416	26	97836	3763
Milling Machines and parts	20	162320	8116	19	222893	11731	23	136648	5941	39	398736	10224
Presses and parts	NA	1160	-	1	775	775	2	18467	9234	5	27690	5538
Rolls, Bending Machinery and parts	-	-	-	-	-	-	-	-	-	NA	34151	-
Shapers, Gear Makers and parts	8	40206	5026	NA	1082	-	3	106179	35393	3	52611	17533
Shearing Mach. & parts	-	-	-	-	-	-	3	17543	5848	8	23075	2884
Machine Tools & Parts n.e.s.	NA	169300	-	NA	126891	-	NA	223439	-	NA	335972	-
Sawing Machines and PT.	-	-	-	-	-	-	NA	11080	-	NA	15691	-
Total	104	625638	4364*	180	636005	2801*	226	843898	2672	181	1580016	6588*

* Average value has been calculated only for those machines for which number of machines was available.

Appendix - 15

List of Interviews made by Survey Team

CANADA

Dates of Visit: 5.6.1968 to 11.6.1968

Team Members:	IIMC	DCo
	Dr. (Mrs.) L. Mohan Mr. Mark Frankenna	Dr. R. Singh

	Name of Firm/Organization	Persons Interviewed	Designation
(A)	Manufacturers		
1.	Standard - Modern Tool Co. Ltd. 69 Montcalm Avenue Torento 10, Ontario	Mr. Tom McDonagh	Technical Sales Representative
2.	Fritz Werner Limited 695 Montee de Liesse Montreal 9, Quebec	Mr. Richard V. Freeman	Gen. Sales Manager
(B)	Distributors		
1.	Gross Machinery (Canada) Ltd. 18, Jarvis St. Toronto 1, Ontario.	Mr. Michael Gross	General Sales Manager
2.	Omnitrade Machinery Ltd. 78 Torlake Crescent Toronto 18, Ontario	Mr. Frank E. Well	Sales Manager
3.	Foullis Engineering Sales Ltd. 5502 Atlantic Street, Halifax, N.S	Mr. Allan D. Foullis	President
4.	Robert Morse Corporation Ltd. 3090 Barrington Street Halifax, N.S.	Mr. Arnold R. Tunis	Regional Manager
5.	R.G. Gardner Machinery Ltd. 9, Arnold Street, Box 367, Station U Toronto 18, Ontario	Mr. Peter Pantalone	

	Name of Firm/Organization	Persons Interviewed	Designation
6.	A.C. Wickman Limited 1425 The Queensway Toronto 18, Ontario	Mr. Frank C. Knott	Supervisor Machine Tool Department
7.	Canadian Ingersoll-Rand Co. Ltd. 800 Birks Building, Montreal, Quebec.	Mr. Jorgen S. Munck	Manager Market Research
8.	Central Bearing Corp. Ltd. 1377 William Street Montreal 3, Quebec	Mr. Mike Pawlus	Manager Machinery Sales
(C)	Users		
1.	Victoria Precision Works Co. Ltd. 2901 Rouen Street Montreal 24, Quebec	Mr. S. Reisman	Plant Manager
2.	Canadian Vickers Ltd. 4970 Notre Dame Street East Montreal 4, Quebec	Mr. L. Latremoille	Vice-President Purchasing
3.	Nova Scotia Institute of Technology, Halifax		
4.	Dosco Industries Limited Halifax Shipyard Halifax.	(1) Mr. Faulkner (2) Mr. Warner (3) Mr. Kenneltle	
5.	B & K Machinery International Ltd. 164 Evans Avenue Torento 18, Ontario	(1) Mr. A.P. Clark (2) Mr. A. Bourne	Vice-President Sales
(D)	Others		
1.	Maclean - Hunter Publishing Co. 481 University Avenue Torento 2, Ontario	Mr. James A. Weller	Editor
2.	The Japan Trade Centre, 151, Bloor Street West, Torento, Ontario		

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1. Introduction

1.1 Industrial Development

The industrial revolution in Japan began toward the end of the nineteenth century, about a century later than in the West. It is noteworthy that Japan achieved an industrial revolution in 30 to 40 years to join the ranks of the most highly industrialised nations in the world.

Although Japanese industry was already highly developed prior to World War II, it was then centred around light industry. Not until after World War II did it begin to centre around heavy and chemical industries. After World War II, Japanese industry, which had suffered heavy damage during the war, made an amazing recovery. The production index in 1947 was 30% of the pre-war level (average for 1934-36). Production reached the pre-war level by 1951 and exceeded the wartime peak (1944) by 1955. The production index was twice the pre-war level by 1956.

In recent years, stimulated by expansion of domestic and export demand for industrial products, the Japanese economy has made startling progress. The index of industrial production in Japan increased by 3.3 times during the decade 1956 to 1966. Heavy industries registered the highest increase in production in the economy. During this period, the production index of all machinery grew 5.5 times, while that of electrical machinery increased 8.1 times.

Japan has a stable population of 100 millions. Rising per capita incomes led to an expansion of production of consumer durable good such as automobiles and domestic appliances. There has been expansion in the processing industries as well. The textile and food industries have been declining. The production of cement, glass, chemicals, rubber and petroleum products has also shown remarkable development.

In 1964, production of machinery, including transport equipment and precision instruments, accounted for 31% of total manufacturing in terms of value added (27% in production value); textiles 8% (9%); iron and steel 7% (10%), food and beverages 9% (12%) and chemicals 11% (9%). The balance has shifted in favour of engineering industries since 1964.

When compared with industrial growth of other developed countries, Japanese industries have been expanding at the fastest rate in the world. The Table - 1 gives a comparison of Index Numbers of Industrial Production by country:

Table 1

1966 Index Numbers of Industrial Production by Country

Country		1966 Index (Base 1960=100)
Japan	..	194.8
West Germany	..	145.2
U.K.	..	140.0
U.S.A.	..	137.5
France	..	117.5

Japan does not have natural resources for her industries which are based upon exceptional human enterprise. Japan imports most of her requirements of industrial raw materials and exports a wide range of manufactured goods from textiles and perfumes to power generators, aircraft and ships.

The tables at Appendix 1 and 2 give basic data on Japanese Industries and Machinery Industry. The growth of machinery production in Japan its imports and exports can be seen from table at Appendix 1. The table gives data for 5 years from 1957 to 1962.

The machinery manufacturing industry in Japan has risen rapidly. In 1965 it accounted for 23.8% of the number of industrial establishments, 32.5% of industrial employment, and 29.1% of industrial output. In 1955 the percentages were 12.6, 20.0 and 28.7 respectively (Appendix Table 2).

1.2 Growth of Engineering Industries

The engineering industries in Japan have shown the most astonishing development. The table at Appendix 3 gives the index number of industrial production for Japan from 1955 to 1966. The industrial production has increased many fold in all sub-divisions of products by 1966. A considerable part of the engineering goods produced in Japan are exported to other countries. In 1966 these accounted for some 4% of the total exports.

Since World War II, the emphasis in Japanese industry has been moving from light engineering to heavy and chemical engineering. The production of light machines and optical instruments, however, is also important. Radio and television receiving sets occupy a significant place in the total production value of machinery. Starting the production of television sets only 18 years ago, Japan produced more than 5 million sets in 1966. One of Japan's long established export goods is cameras. The production of cameras in 1966 surpassed the 1955 level by 5.4 times. And the exports of the same year were 9 times that in 1955. The production of telephones, electric fans, watches and clocks, sewing machines and bicycles which are important export goods, is also noteworthy.

Within the heavy industrial section which greatly developed after World War II, the production of steel vessels, motor vehicles and rolling stock is relatively important. Shipbuilding in which Japan is the world's largest producer, has been the country-leading industry for many years.

In recent years, motor vehicles such as trucks, passenger cars and three-wheeled vehicles as well as motorcycles and motor scooters have showm remarkable increase in production. In 1966, production showed an increase of 52 times for trucks, 5.9 times for buses, 551 times for passenger cars and 916 times for motor cycles as compared with the 1950 figures. Now Japan holds second place in the world in the production of commercial vehicles, surpassed only by the U.S.A.

The table at Appendix 4 gives production statistics etc. of selected engineering items.

Japan(1) ranks as the fourth largest exporter of engineering products in the world. The engineering products exported from Japan range from large-capacity hydroelectric and thermal power generating machines, mammoth supertankers, rolling mills for iron and steel, heavy construction machinery, mining machinery, machine tools, commercial and passenger cars to electronic products, etc. The trend in exports and imports of engineering products from Japan is shown in the table at Appendix 5. In 1962, exports of engineering products were about $ 1,252 million and had increased to about $ 2,642 million in 1965, or about 4 per cent and 5.8 per cent respectively of total world export of engineering products. On the other hand, imports in 1962 were $ 770 million, falling to $ 658 million in 1965. Exports of industrial machinery including electricals from 1962 to 1965 accounted for 50 to 60 per cent of the total value of engineering goods exported during the period.

2. Demand for Machine Tools

2.1 Total Demand for Machine Tools

Table 2 gives data on production, demand, export, import, stock and domestic consumption of machine tools for years 1955 to 1966. Domestic demand was worked out using the formula: Production + Imports - Exports ± Stock or change in stock. The table shows the index numbers with 1955 as base year and production import, export and stock as percentage of domestic consumption. Production has risen sharply from 1955 to 1964 and declining in 1965. Imports show a fluctuating trend. Exports are growing fast. Domestic consumption reached a peak in 1962, and declined sharply in 1966.

---

(1) Bulletin of Statistics on World Trade in Engineering Products, 1964 and 1965, United Nations.

Table 2

Total Demand, Production, Export, Import, Stock and Domestic Consumption of Machine Tools

	Production			Imports			Exports		
Year	Value in US $ million	Index base 1955=100	Prod.% of domestic consumption	Value in US $ million	Index base 1955=100	Import % of domestic sonsumption	Value in US $ million	Index base 1955=100	Export % of domestic consumption
1955	10.2	100	60.0	11.2	100	65.9	2.0	100	11.7
1960	115.9	1135	70.3	55.0	491	33.4	4.5	225	2.7
1961	212.3	2082	73.0	107.5	960	36.9	6.7	335	2.3
1962	291.4	2851	69.8	132.8	1184	31.8	7.3	365	1.8
1963	268.8	2635	83.5	63.0	562	19.5	11.9	559	3.7
1964	250.5	2459	87.4	59.5	531	20.7	18.2	910	6.3
1965	177.0	1733	95.0	38.7	346	20.8	24.8	1240	13.3
1966	199.7	1956	104.0	20.9	187	10.9	40.3	2015	21.0

	Stock					Domestic Consumption		
Year	Value in US $ million	Index base 1955=100	As % of domestic consumption	Stock as % of production	Stock as % of domestic consumption	Value in US $ million	Index base 1955=100	As % of production
1955	2.4	100	2.8	2.4	14.1	17.0	100	167.0
1960	4.0	167	0.4	3.5	2.4	164.8	968	142.3
1961	25.6	1068	1.4	12.0	8.8	291.5	1712	137.0
1962	25.6	1068	1.1	8.8	6.1	416.9	2450	143.0
1963	23.4	975	1.0	8.7	7.0	322.1	1895	120.0
1964	28.2	1175	1.4	11.3	9.8	287.0	1688	114.8
1965	32.9	1370	1.9	18.5	17.7	186.2	1096	105.2
1966	21.1	880	1.1	10.6	11.0	192.1	1130	96.3

Source: On export and import, Ministry of Finance (Statistics of Customs Clearance); for production data MIYI.

2.2 Machine Tools Demand by Industry

Table 3 below analyses demand for machine tools by industry and shows that the metallurgical and engineering industries contributed to the decline in demand for machine tools from 1963 to 1965. However industry-wise demand picked up in each case in 1966 and showed considerable strength in 1967. The table gives empirical support to the view that machine tools demand is picking up in recent years and is expected to surpass earlier peaks. The table also indicates that the automobile and general machinery industries are the major buyers of machine tools in Japan.

Table 3

Machine Tools Demand by Industry

(Value: US $ 1 million)

Industry	1963 80*	1964 80*	1965 70*	1966 70*	1967 69*	Value in 1967 as percentage of 1966	% share in 1967
1. Iron & Steel	9	7	5	8	20	250	6
2. Metal Product	10	10	8	10	14	140	4
3. General Machinery	76	69	40	75	119	159	34
4. Electrical Machinery	13	13	6	9	23	256	7
5. Automobile	38	57	33	56	103	184	29
6. Shipbuilding	8	9	5	8	15	188	4
7. Precision Machinery	10	11	7	12	18	150	5
8. Other Industries	5	6	6	9	10	111	3
9. Governmental	4	5	6	7	6	86	2
10. Trading Firms	17	16	7	11	22	200	6
11. Others	1	1	1	1	2	200	-
Total of Domestic Demand (I - II)	191	204	124	206	352	171	100
12. Exports	11	13	19	36	43	125	-
Total (1 - 2)	202	217	143	242	395	163	-

* Number of companies

Source: "Statistics of Machine Tools Demand" (Japan Machine Tools Builder's Association)

2.3 Machine Tools Demand by Types of Machines

Table 4 shows Machine Tools demand by type -

Table 4

Machine Tools Demand by Type

(Value: US $ 1 million)

Industry	1963 80*	1964 80*	1965 70*	1966 70*	1967 69*	Value in 1967 as percentage of 1966	% share in 1967
Lathes	72	72	45	74	123	166	31
Drilling Machines	12	12	8	13	19	146	5
Boring Machines	18	15	13	23	38	165	10
Milling Machines	27	32	22	40	64	160	16
Planers	6	5	2	3	5	166	1
Grinding Machines	30	30	17	34	67	197	17
Gear Cutting & Finishing Machines	8	8	4	8	15	188	4
Special Machines	17	26	19	25	43	172	11
Others	14	16	12	22	20	91	5
Total	204	216	142	242	394	163	100

* Number of companies.

Source: "Statistics of Machine Tools Demand" (Japan Machine Tool Builder's Association)

The breakdown of demand by type of machine is very close to production breakdown by machine types. Lathes account for about one third of the total demand and are the largest production item as well.

Shares of grinding, milling and boring machine have been 17%, 16% and 10% respectively.

Reviewing the demand trend in 1967 by type of machine, we see that demand for all types has increased. Demand for grinders, planers and gear cutting machine has expanded by more than 90%, specialized machines by more than 70% and lathes, boring machines, and milling machines by over 60%.

The demand by types of machine tool is also shown in Appendix 6. The tables give data for Production, Imports, Exports, stock and domestic consumption of Lathes, Drilling Machines, Milling Machines, Boring Machines, Gear Cutting Machines and other machines. Exports of all these machines shows increasing trend, reaching a peak in 1966. Imports are also under control. Production and domestic consumption of all the machines show sharply increasing trends till 1965 but fluctuations began in 1966.

3. The Japan Machine Tool Industry

In the SEAO region, Japan is the biggest machine tool manufacturer. At the same time she is one of the biggest machine tool importers, exceeded in recent years only by Australia. However, Japan is the biggest machine tool exporter from the region and is one of the principal exporters in the world. Machine tools production in Japan in the year 1967 was of the order of U.S. $ 346 million. Her exports were about U.S. $ 50 million. Machine tool imports into Japan in the same year totalled U.S. $ 35 million.

3.1 Status of the Machine Tool Industry

The ratio of machine tools production to total national production of machinery is about 2 per cent.

However, it enjoys as in other countries an indisputable position as a basic sector of modern industry inasmuch as machine tools are "machines for making other machinery" and since the industry is charged with providing vital capital facilities for the machinery industry as a whole.

3.2 History of Development

The construction of the Nagasaki Iron Foundry in 1858 and the importation of some 40 units of machine tools from Holland by the Tokugawa Shogunate (Government) virtually started Japan off on the road that was to give the country the modern machine tool industry and technology that she possesses today.

Later, from about 1870, utility machine tools came to be manufactured at the Machinery Manufacturing Factory of the government. Stimulated by the expanding national economy and the growth of various enterprises, the machine tool industry has been growing steadily since 1890.

A half century later, during the Pacific War (1941-1945), production had risen to 140,000 tons. The industry underwent a decade of depression and curtailed operations after the military defeat in 1945.

It was only from about 1955 that the production of machine tools began showing expansion with the growing demand for renovation of existing facilities by the flourishing machinery industry.

That is, production, which during 1955 had been 6,600 tons and ¥ 3,680 million ($ 10 million), doubled steadily year after year, growing in scale to 98,373 tons and ¥ 76,453 million ($ 212 million) by 1966.

Thus, the machine tool industry has contributed immensely to the development of the machinery industry by mass production systems in step with the spectacular growth of the Japanese economy, especially the automobile, electrical machinery, precision machinery and other industries.

3.3 Production Structure

The table at Appendix 7 shows the trend in production of machine tools by types for the years 1955 to 1966. As indicated earlier the production trend rose sharply upto 1964 and fluctuated in 1965 and 1966. The Table 5 in detail explains the types of machines produced and trends in production. Appendix table 8 shows production and shipment of metal cutting machine tools of Japan in 1967.

Table 5 gives the Japanese production of NC Machine Tool in 1967. The production of NC machines in Japan is mainly on Milling Machines, Boring and Drilling Machines.

Table 5

Japanese Production of NC Machine Tools, 1967

Type	Number	Value $ US	Average value $ US
Lathes	8	292,736	36,592
Drilling	15	275,111	18,341
Boring	21	1,497,951	71,331
Milling	43	1,437,529	33,431
Grinders	5	510,277	102,055
Gear Cutting	1	36,666	36,666
Special Units	9	796,999	88,555
Miscellaneous including machining centers	12	266,086	22,174
Total	114	5,113,355	44,854

Source: JMTBA, See Iron Age, Sept. 5, 1968, p. 11.

3.3.1 Production Range and Types

Japan manufactures more or less all types and a large range of machine tool sizes. The number of machine tool manufacturers classified by types of machines is given in the table at Appendix 9. Small precision machine tool manufacture is, of course, well established, mainly for the watch, camera, electrical and electronic industries. The larger and heavier machine tools - horizontal boring machines upto

100 mm, vertical lathes 8000 mm, planers 1500 mm x 1250 mm x 4500 mm and gear cutting machines upto 5600 mm are being increasingly manufactured. Japan has a well established iron and steel industry and also leads in ship building. Large and heavy machine tools are required for such industries. However, Japan is behind USA in ultra-heavy machine tools. It is similarly trailing the USA with regard to N/C, EDM, ECM and other sophisticated machine tools such as thread grinders, transfer lines equipment etc. However, it is rapidly catching up. The table at Appendix 9 gives the machine tool manufacturers classified by types of machines.

The average number of workers perfecting in the machine tool industry is about 100. The largest factory employs about 2000 workers. The average age of machine tools is 5 - 10 years of 45% of the equipment (critical machine tools only).

3.3.2 Enterprise Scale

A total of approximately 270 companies are engaged in the manufacture of machine tools, of which 105 are member firms of the Japan Machine Tools Builders' Association, who contribute 86 per cent of total production.

The breakdown of Japan's machine tool industry by enterprise scale, of the 105 member firms of Japan Machine Tool Builders' Association, indicates that enterprises capitalized at under ¥ 100 million ($ 278,000) number 45, or one half of all enterprises, and their combined output register a mere 15 % of the total. (Appendix 10).

The main stay of the machine tool industry are the corporations with a capital scale in the range of ¥ 500 million to ¥ 3,000 million ($ 1,389,000 - $ 8,333,000), of which the 5 corporations in the upper brackets contribute 25 per cent of total production. This contribution, by the way, is a small occupancy ratio.

3.4 Technological Development

3.4.1 Technical Collaboration

It is common practice amongst engineering goods manufacturers all over the world to copy or improve upon the features of each other's machinery. Machine tools are no exception and, at one time, Japan was considered to be one of the best "copiers". However, if a product is to be made equal to or better than the original, there is much more involved than mere copying, such as material specifications, manufacturing limits, heat treatment etc, which a manufacturer develops over long periods of experience, trial and error, research and development.

Realising this, the manufacturers began importing foreign know-how from about 1955. According to the publication Machine Tools in Japan today, upto 1967, about 40 technical know-how agreements have been entered into, mostly with the USA and some with French, Swiss and West German companies.

3.4.2 Manufacturing Practice

Following the world trend, particularly to cater to US requirements, Japan is manufacturing machine tools with higher speeds, higher horse power, improved rigidity (with reasonable increase in weight) for mass production engineering goods with repetitive accuracy within close tolerances.

Castings and forgings are purchased from outside sources. Other bought-in items generally include gears, 'bearings', pneumatic, hydraulic, electronic controls including N/C consoles; etc. Some special items such as Allen screws, special belts and lubricating systems require to be imported. On an average, 65% components are purchased externally and 35% are manufactured in-plant. The import content is 3%.

However, the tendency is to reduce the quantum of farmed out work. The reasons for this are:

i) 5-6 years back, the labour rates in the small manufacturers were much lower than at the larger organised factories who extend all types of amenities to their workers (bonus, transportation to and from home, subsidised lunch, welfare funds, uniform, housing etc). Today, with rapid industrialisation, the small-factory workers' wages are reaching the level of the larger factories.

ii) Further, with rising standards of living, spiralling material and labour costs, the small manufacturer is not able to keep his prices down by modernising and replacing his equipment with material saving and higher productivity machines.

iii) The larger and better manufacturers are continually installing in their factories highly automated, numerically controlled and other highly productive mother machine tools in their constant battle for cost reduction - one man operating two machine tools at a time etc.

A leading Japanese machine tool builder even manufactures its own N/C equipment though the general practice overseas is to buy such equipment from specialised electrical manufacturers.

Some special features were noticed in the factories visited.

Lead screws were rough thread milled and then finished by point tool in air-conditioned room. Cryogenic or sub-zero treatment equipment was noticed but the management was reluctant to reveal the nature of components requiring such stabilising treatment. Diamond point cutting tools were used for high mirror finishing of non-ferrous components.

Unlike some well-known foreign machines with calibrated traverse screws which were out, a standard scale with optical reading is provided. Small windows are provided near the hand-wheel showing figures which indicate directly the diameter and length of the job. Ball screws and nuts, used in N/C machine tools are also increasingly being used for non-N/C machines for easy reversibility and longer life.

In metalworking presses, automatic feeding devices for higher speed presses have been developed.

Transfer line presses and other equipment required for the car industry have fostered the growth of special purpose machine tool manufacture.

3.4.3 Industrial Engineering

Workers have a sense of belonging to the factories and generally work for years in one organisation. A high sense of discipline and pride of workmanship contribute to high productivity. However, in the factories visited, computerised job scheduling etc. like those noticed in the USA were not seen.

At better factories, industrial engineering studies, incentives and bonus were in vogue, but details were not made available.

The machine operators carried out the inspections themselves. Stage inspection and final inspections were carried out by the inspection department.

3.4.4 Standards

Japan Industrial Standards (JIS) are followed. However, some works e.g. Okuma and Makino, mentioned that their own standards were more precise than JIS. For exports, the importing countries' standards were followed, such as CSA (Canadian Standards Association). It should be noticed that some countries like Canada are very strict, particularly for electricals and will only allow import of machine tools conforming to their own standards.

3.4.5 Packing

Seaworthy packing in accordance with the JIS is followed. Much great care is taken for export packing, crates are tested to determine its effectiveness to stand bad handling at the docks etc.

Vacuum packing of the machine inside the crate was done to prevent corrosion from moisture. Outside specialised packers are also employed.

3.4.6 Research & Development

Japan gives great importance to research and development. The reduction of cost is the foremost objective for all research and development. However, considerable fundamental and pure research is undertaken by the government institutions, universities and the manufacturers themselves. The Government Mechanical Laboratory has been working on dynamic rigidity, N/C equipment, prevention of stick-slip on the guideways etc. Studies have been conducted on friction and wear and 'plastic' slideways are being effectively utilised for large machines. Some manufacturers like Okuma have developed hydro-dynamic bearings for grinding wheel spindle bearings.

Built-in electronic automatic sizing equipment capable of automatically finishing the work diameter to fit an already finished hole has been developed by a grinding machine manufacturer.

Large complex such as Hitachi, which manufactures varying types of engineering goods including machine tools, employ as many as 2500 research workers who are concerned with basic scientific and technical research.

Ultra-modern laboratory facilities have been provided including hydraulic power, atomic energy power, isotopes investigation, automatic controls, etc.

The user factories visited included manufacturers of:

i) electronic equipment
ii) railway rolling stock
iii) automobiles
iv) a technical training institute.

Discussions with the dealers, importers and Government officials also brought forth the technical requirements of the users of machine tools.

Unlike USA, the user factories visited did not have a planned replacement programme of machine tools. Machine tools were mostly purchased for expansion. Higher productivity machine tools were also purchased, but not against planned obsolescence. The tendency was to build ones own special purpose machines, transfer equipment and assembly lines. Of course, the electronic factory also built its own N/C machine tools including many general and special purpose machine tools.

Users preferred indigenous machines to imported ones because of the 'Buy Japanese Policy' and superior after sales service.

3.4.7 Pre-Sale Engineering

Though pre-sale engineering was available from the manufacturers/agents of machine tools, yet it appeared that the responsibility, particularly for the success of the special purpose machines, transfer lines etc, lay with the User-Buyer.

In the USA, the user-buyer will prepare the specifications for his special machine tool requirements, indicate the production rates and other special features. A smaple or drawing of the product will also be made available. The engineers of the machine tool builder will develop the design and the prospective buyer will get quotations with outline sketch, flow of material etc, for his scrutiny and acceptance, after which the detailed manufacturing drawings are prepared by the machine tools builder.

In Japan, all this design and drawing work had to be done by engineers of the user-buyer himself. Detailed working drawings are prepared and handed over to the machine tool manufacturer. Such procoedures take much of the time of the Japan user-factory engineers which could have been more profitably employed on productive work.

Some of the user-buyers stipulated manufacture to their own standards since they felt that JIS was too general for their purpose.

3.4.8 After-Sales Service

The user-buyer expects erection and break-down services from the machine tool manufacturer/agent. Easy supply of spares is another reason for purchase of indigenous machines.

3.4.9 Technical Training Institutes

Japan believes in giving intensive technical training to its technical and sales staff, including workers. In some factories, certain basic machine tools, automatic and even numerically controlled machines have been set aside for apprentice training and, also, for training representatives of dealers and clients.

4.0 Machine Tool Imports

4.1 Import Trends

In the preceeding few years, the tendency in Japan has been to meet the growing demand for machine tools by domestic manufacture, and her exports have been steadily growing. In volume, although import of machine tools into Japan has shown a slight increase in recent years, its overall dependence on imports has progressively diminished. An idea about recent trends in imports of machine tools into Japan can be had from the table.

Table - 5

Import of Machine Tools into Japan during 1951-67

Year	Value in US $ (Million)
1951	0.5
1952	2.4
1953	6.2
1954	14.5
1955	11.2
1956	7.0
1957	33.8
1958	38.2
1959	29.0
1960	55.0
1961	107.5
1962	132.8
1963	63.0
1964	59.5
1965	38.7
1966	20.9
1967	14.5

It would be observed that machine tool imports into Japan have been declining rapidly.

4.2 Imports by Types

Analysis of machine tools imports into Japan by types of machine shows more than 30 per cent of the machine tool imports has been accounted by lathes, followed by grinding and milling machines, accounting for 17 and 16 per cent respectively.

Table 6

Machine tool Imports into Japan by Types of Machine 1967

(Million U.S. $)

Type of Machine	Value	% of Value
Lathes	123	31.21
Drilling Machines	19	4.82
Boring Machines	38	9.64
Milling Machines	64	16.24
Planers	5	1.26
Grinders	67	17.05
Gear Cutting & Finishing Machine	15	3.80
Special Purpose Machine	43	10.11
Others	20	5.07
Total :	394	100.00

Source : Statistics of Customs clearance, Ministry of Finance, Japan

Generally, major items of imports into Japan are planers, surface grinders internal grinders, and gear cutting machines. Requirement of these types of machines is generally from the automobile industry. The second largest group of machines imported into Japan has been boring machines. Horizontal borers upto 200 millimetre of lower spindle are also being imported. These are mostly required by machine tool and industrial machinery manufacturers. Import of Automatic single spindle lathes, automatic metal spindle lathes, and jig boring machines has been also going up in recent years. Import of boring and milling machines, however, has diminished during the past few years.

4.3 Import Market for Sophisticated Tools

After hitting the record total of $ 132 million in the boom investment year of 1962, imports have continued to decline each year, falling to $ 14.5 million in 1967. This downward trend in imports was caused by the recession during the last two years as well as by the increased use by Japanese customers of Japanese machine tools.

The United States was the biggest supplier of machine tools to Japan with 45%, followed by West Germany with 30%, Switzerland with 13% and England with 3%.

From the standpoint of the international machine tool trade which will be accelerated by the Kennedy Round talks for trade liberalization, Japan will continue to buy foreign machine tools which are excellent in quality, appropriate in price and speedy in delivery time. Japan continues to be a good market for some of the large and sophisticated machines which are needed by Japan to modernize its production facilities.

However, as would be observed from Tables 6, 7 and Appendix table 11 most of the machine tools imported into Japan is coming from highly industrialised and technologically advanced countries, the U.S.A., West Germany and Switzerland in particular. It would be noted that U.S.A., West Germany and Switzerland all three combined account for as much as 86 per cent of the total machine tool imports into Japan.

Table 7

Countrywise Machine Tools Imports into Japan : 1967

(1000 U.S. $)

Country	Units	Value	% Share
U.S.A.	894	13953	40
West Germany	7886	11784	33
Switzerland	2413	4744	13
U.K.	94	1333	4
U.S.S.R.	176	835	2
France	181	546	2
Italy	26	536	2
Others	357	1932	4
	12027	35663	100

Analysis by type of machines imported from these countries shows that mainly special purpose machines have been imported from Germany and the U.S.A. while imports from Switzerland have been of precision machine tools.

Europe has been the chief supplier of Automatic lathes (69%), Jig Boring machines (80%), Milling machines (55%), Thread grinders (94%), Gear Hobbing machines (92%) and Broaching machines (78%).

North America predominantly the U.S.A., has been the highest supplier of drilling machines (60%), Internal Grinders (81%), Gear Cutting machines (68%) and Gear Finishing machines (83%).

The communist bloc although it has a relatively small share (5%) of the total machine tool imports into Japan, has been the leading supplier of vertical boring and turning machines, (100%) engines Lathes (58%), Horizontal Boring machines (33%), Drilling machines (22%), Milling machines (23%), and Super Cutting grinders (25%).

The tables Appendix 11, 12 and 13 gives machine tool imports by type of machines and origin by blocs and country of origin for 1966 and 1967. The table appendix 14 gives sectorwise analysis of Machine Tool Imports into Japan.

It would be observed that the aircraft industry is the biggest sector accounting for machine tool imports (28.9%).

However about 60% of imports have been for general engineering industries. The share of electrical machinery industry, transport equipment and precision instrument industries have been 15.7%, 60% and 6.4% respectively. However, share of the aircraft industry has been growing steadily and that of others has been falling gradually.

This indicates that the aircraft industry has been developing fast in recent years and the specialised machinery required by the industry is not yet domestically manufactured. As against this, machine tools required by other sectors have been progressively met by local industry and hence their share in imports has been falling down these years.

Further, it would be observed that Japanese machine tools imports are of sophisticated, mainly required for the aircraft industry and the automobile assembly lines of automobile manufacturing units. Most of these have been coming from the U.S.A., which specialises in such special purpose machines.

There is, however, no ban on imports of machine tools into Japan. Free flow of machine tools into Japan is allowed. The policy of not having any quantitative or quota restriction or tariff barriers against imports itself indicates that the local industry in Japan is now in a position to compete with overseas manufacturers freely. Many manufacturers felt it to be good as it makes the industry feel more alert and realise its responsibility more intensively than otherwise and consequently make efforts to work more efficiently than under protection.

The table at Appendix 15 gives tariff rates on machine tools imported into Japan.

A list of importers of machine tools together with the addresses is given in Appendix table 16.

5. Machine Tool Exports from Japan

Japan is the fourth largest producer and tenth largest exporter of machine tools, with production of US ≠ 346 million and exports of ≠ 50 million in 1967. This represented 5.7 % of world production and 3.3% of world trade.

5.1 Export Trends 1951-1967

Japan entered the international machine tool market quite recently. Prior to the 1950's Japan did not have any significant export of machine tools, and exports did not exceed one million ≠ during the 1950's. However, beginning with a large increase in 1960, exports have increased to well over 2000% of the highest level achieved in the 1950's, and continued growth is expected. Table 8 shows the level of machine tool exports for 1951-67.

Table 8

Exports of Machine Tools from Japan (1951-1967)

Year	Value in US $ (Mil.)	Growth Index Base 1951=100
1951	0.8	100
1952	1.0	122.7
1953	1.0	143.7
1954	1.5	191.6
1955	2.0	250.0
1956	1.5	184.2
1957	2.0	253.1
1958	1.3	167.1
1959	1.4	173.4
1960	4.5	567.5
1961	6.7	850.6
1962	7.2	904.5
1963	11.9	1501.1
1964	18.2	2275.5
1965	24.8	3126.9
1966	40.3	5108.3
1967	51.7	6538.5

Source : Statistics of Customs clearance, Ministry of Finance, Government of Japan.

During the Fifties, Japan herself was depending upon imports for a sizable portion of domestic demand for machine tools. Till the early 60's, Japan did not have, as a matter of fact, a well-established machine tool industry of repute in the world market.

Appendix table 6 gives machinewise demand, production, import and export structure. It would be observed that Japan is now producing as well as exporting machine tools of almost all types. Her import ratio has been gradually declining in the past few years, although import magnitude has been remaining more or less stagnant. Her export ratio has been rising progressively every year. In 1967, exports accounted for about 15% of the total production of machine tools. Comparison of average unit prices of different types of machines shows that the average unit price of imported machine tools has been higher in the case of Grinders, Gear-cutting and finishing machines and special purpose machines (mostly for automobile and vehicle manufacturing industries) have been higher significantly compared to the domestic average unit price of these types. It shows that more sophisticated lines are not manufactured locally and are imported. The combined share of these three groups of machines in imports in 1967 was more than 70% of the total imports. More than 75 percent of machine tools imported in Japan were of either U.S., West German or Swiss origin.

However, since 1966 exports of machine tools from Japan have exceeded imports. The Destinationwise Export of Machine Tools from Japan during 1967 to Major Markets is shown in table 9. The U.S.A. is the biggest market for Japanese Machine Tools.

Appendices 17 and 18 give details of exports in 1967 by type. The table also includes details of Japanese exports of machine tools to the five major markets of U.S.A., Canada, West Germany, England and Australia.

Appendices 19 and 20 give the export data on Japanese machine tools by type and country for the year 1966.

Table 9

Destinationwise Export of Machine Tools from Japan during 1967 - Major Markets

Country	Unit	Value (US $ 1000)	% (Value)
U.S.A.	7016	22,174	45
U.S.S.R.	417	5,725	12
South Korea	7233	3,287	7
Taiwan	2491	2,693	5
Communist China	226	2,154	4
Australia	1122	1,873	4
Canada	1506	1,869	4
EEC	951	1,069	2

Source : "Statistics of customs clearance" (Ministry of Finance, Japan).

5.2 Japan: Example of creating overseas Market

More than 70% of machine tools exports from Japan have been to developed economies. As a matter of fact, only about 10% of world consumption of machine tools is accounted by the developing world and the balance of 90% is consumed by the developed economies.

5.3 Contributing Factors for the Success of Japanese Machine Tools in World Export Market

5.3.1 Factors Internal to the Industry

i) In Japan, there are about 280 manufacturers of machine tools, of which 104 manufacturers are organised on a large scale and account for 95% of the total output. The average number of workers employed by smaller units is 100 and for larger units about 2,000 persons. A large number of machine tool manufacturing units are located in Tokyo, Yokohama, Nagoya, Kobe, Hiroshima and Osaka industrial centres. Most of the large scale units are constituents of giant business combines like Mitsubishi, Toshiba, Hitachi and others, each of whom own some hundred odd plants turning out products ranging from toiletries to locomotives.

The economies resulting from membership of large business combines are many and varied. Most important is the availability of a broadly experienced and efficient management, trained technical personnel, established market channels, ample financial resources, and an internal supply line of several inputs from within the combine. Finally, being a member of a large business group greatly enhances ability to sustain periodic slumps.

Most of the machine tool plants turn out several lines of industrial machinery and allied products alongside machine tools. This gives the unit flexibility in its operations and a more stable market.

In the Japanese machine tool industry, units specialise on a very few types of machine tools, say turret lathes, milling machines, centre lathes, drilling machines or presses. There is no tendency amongst manufacturers to expand product ranges horizontally to cover more types. Instead they attempt to enlarge the range of models of basic types in which they specialise. This is being done on a gentleman's agreement basis under the auspices of Japan Machine Tool Builders Association in a way that eliminates unhealthy competition amongst the machine tool manufacturers, and, at the same time, it promotes healthy competition amongst the constituent members. Every six months JMTBA projects machine tool demand for the next six months on the basis of orders received and aggregate economic parameters. On the basis of these projections, the members fix their own targets. JMTBA members number 68 and account for more than 80% of the machine tool output.

ii) The Japanese machine tool industry has achieved technological maturity. The Japanese machine tool industry has begun to export technology, in some cases even to the foreign firms from which it originally obtained the technical know-how. This is evidenced in a statement by some American and West German manufacturers that "Japan is no longer a partner, but a formidable rival". Many of the Japanese firms which entered into collaboration arrangements with Germany, Switzerland, the U.S.A. and the U.K. have suspended their technical ties by now. They are now speedily developing more sophisticated product lines.

Japanese machine tool manufacturers, like Okuma Machinery Works, are developing N.C. machine tools with their own technology. In particular, firms like Toshiba Machine Company, Ikegai Iron Works, Niigata Engineering Company, Hitachi Seiki, Makino Milling Machines Company, Okuma Machinery, Fuji, and Mitsui Seiki are well known for the high quality of their machines not only within Japan but in overseas markets, including the U.S.A. in particular. The high standards of quality conforming to international standards has been responsible for the ready acceptance of Japanese machine tools in overseas markets.

iii) On an average, 80 per cent of the capacity of Japanese machine tool industry is being utilised, which is very high compared to that of other nations. As a result, overheads on machine tools are lower than in other countries. This means greater ability of Japanese Manufacturers to compete in world markets.

iv) The reliance of the Japanese machine tool industry on Government as compared to India is very low. Developments which individual units in the industry cannot do on their own are undertaken jointly on a cooperative basis by the industry instead of looking to the Government for help. The existence of a number of joint bodies like Japan Machine Tool Trade Association, Japan Machine Tool Builders' Association, and Japan Small Machine Tool Manufacturers' Association show the extent to which the industry relies on "self-help" methods.

The Japan Machine Tool Trade Association, which was established just five years back, vigorously promotes Japanese machine tools abroad and offers consulting services and technical information to the interested parties. JMTTA has branch offices in Chicago, Dusseldorf and Sao Paulo and has a roving team of consultants to cover South-east Asia. The JMTTA offices at Chicago and Dusseldorf have about 300 sq meters of exhibition room which can display and demonstrate up to 20 to 25 machines. Each of these offices is manned by experts who are fully qualified to demonstrate the machines and answer technical questions. These personnel, as a policy, have "in-industry" experience and "in-industry training". JMTTA receives an annual subsidy of US $ 240,000 from the Government.

JMTTA also organises the Japanese machine tool industry's participation in international exhibitions and trade fairs. The Association maintains a specially qualified staff drawn and trained from within the industry for the purpose of participation in exhibitions and trade fairs. In addition to this, JMTTA sends teams to various countries every year (3 to 4 teams a year) to study the market, to introduce Japanese machine tools in the countries visited, to promote ties between the Japanese machine tool builders and foreign dealers and end-users. The Association also arranges direct contacts between interested buyers and machine tool manufacturers.

JMTTA collaborates with JMTBA (Japan Machine Tool Builders' Association) in bringing out several publications, which include the JMTTA News Bulletin* and a hand-book* of Japanese machine tools, giving selected models with complete specifications and details. In addition, the Association also undertakes compilation and analysis of relevant statistics on demand, production, supply, export/import, and shipment of machine tools in an elaborate manner. Their analysis is made available to the industry periodically. Special studies and market surveys are also undertaken from time to time.

v) Japan is investing large sums on research and development. Table 10 gives an idea of the allocation of research funds by manufacturing industries.

It will be observed that about 2% of the sales turnover is spent by the industry on research. Hitachi Seiki, Ikegai Tekko, Ohsumi Tekko, and Toyota Koki are together spending about US $ 1.9 million every year on research, which amounts to 2.16 per cent of their total machine tool turnover.

In the field of research the Japanese machine tool industry employs thousands of engineers and technicians to conduct continuing studies on the five main divisions of machine tools viz., Lathes, Drilling, Boring, Milling and Grinding. There are six other groups reported to be working on slideways, gears, bearings, hydraulics, electricals and instruments. Along with these, five other special teams are working on rigid displacement, main spindles, lubrication and endurance and practical tests. Technical research and development is being concentrated on higher speed, greater precision and more automatic features. Great progress has already been accomplished in the field of specialisation and numerical control of general purpose machines.

Table 10

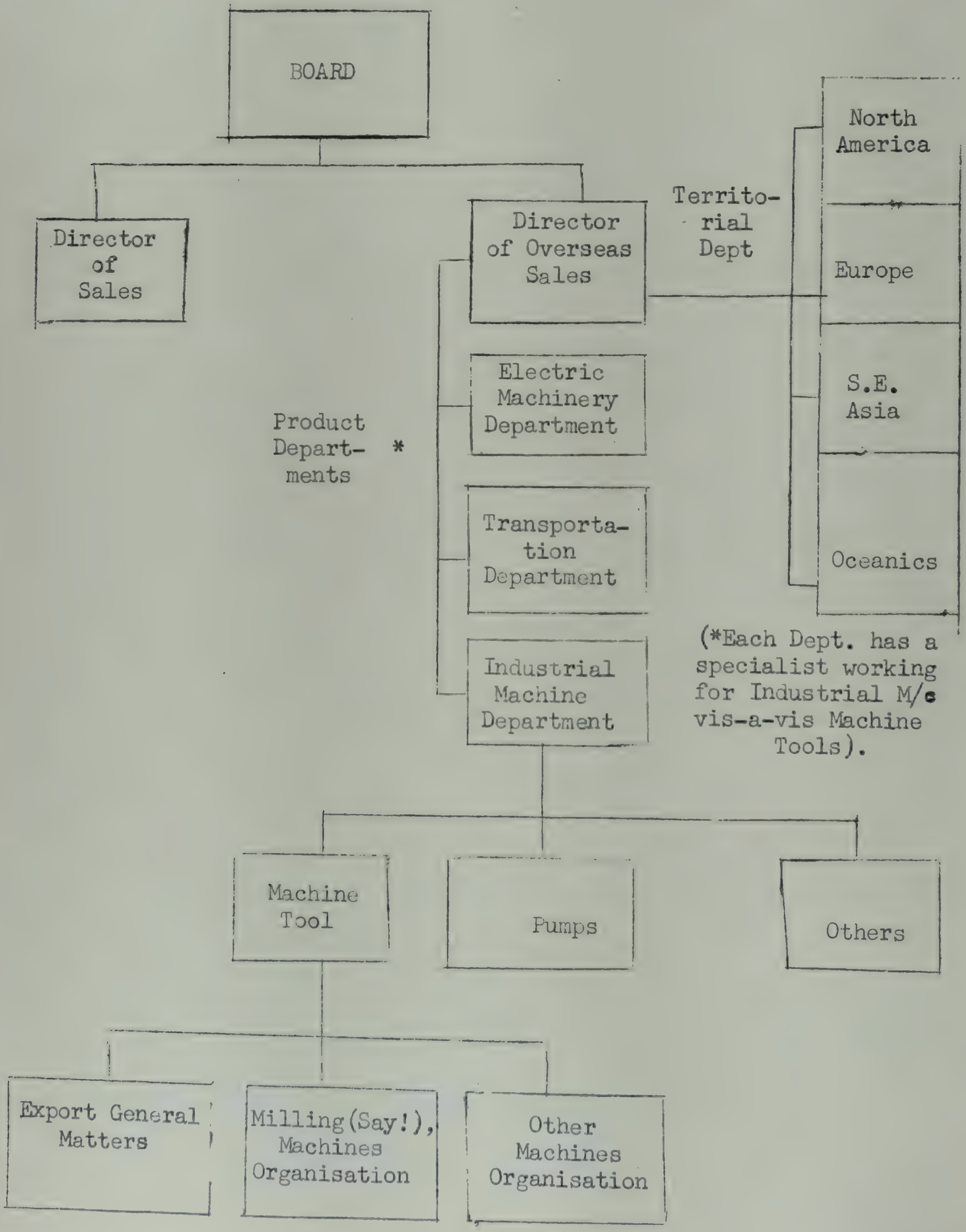
Research Fund Assocation by Manufacturing Industries (1964)

	1963			1964		
	No.of Establishment	Research Fund in US $ (Million)	% of Sales	No.of Establishment	Research Fund in US $ (Million)	% of Sales
All Industries	7,457	579	0.91	10,197	681	0.92
Manufacturing	7,153	525	1.04	9,605	623	1.06
Machinery	2,054	242	-	2,863	273	-
General machinery	663	29	1.12	1,348	53	1.08
Electrical machinery	917	141	2.29	792	141	2.28
Transporting machinery	267	63	1.06	272	68	1.16
Precision machinery	107	10	1.29	451	11	1.12
Hitachi Ikegai Tekko Ohsumi Tekko Toyota Koki	4	0.8	1.06	4	2	2.16

Source: JMTBA

Chart - 1

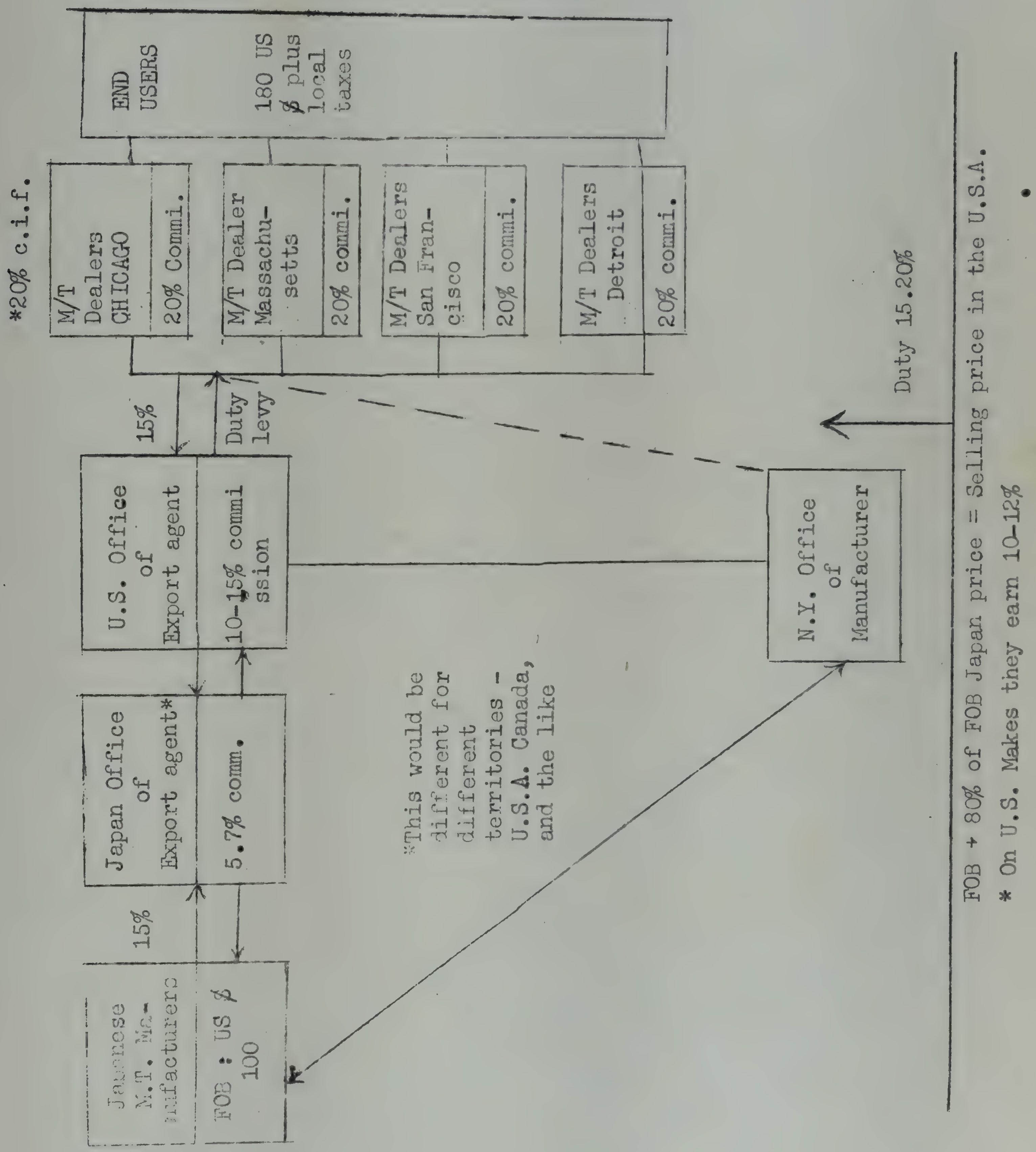
Typical Overseas Selling Organisation of Japanese Machine Tool Manufacturer


BOARD
Director of Sales
Director of Overseas Sales
Territorial Dept
North America
Europe
S.E. Asia
Oceanics
Product Departments *
Electric Machinery Department
Transportation Department
Industrial Machine Department
Machine Tool
Pumps
Others
Export General Matters
Milling (Say!), Machines Organisation
Other Machines Organisation

(*Each Dept. has a specialist working for Industrial M/c vis-a-vis Machine Tools).

Chart - 2

Distribution Channels used by Japanese Machine Tool Manufacturers



*This would be different for different territories - U.S.A. Canada, and the like

FOB + 80% of FOB Japan price = Selling price in the U.S.A.

* On U.S. Makes they earn 10-12%

vi) Japan has a well-established network of institutions to promote her export trade. JETRO (Japan External Trade Organisation) is at the apex of all trade promotion organisations. JETRO has about 85 overseas offices all round the world to promote export of Japanese manufacturers and provide liaison and research services. Alongside this, the Japan Export-Import Bank offers deferred payment facilities to the exporters of industrial machinery inter-alia machine tools and ships. The Japan Engineering Consulting Institute promotes Japanese joint ventures overseas and provides consultancy services (technical know-how) to overseas entrepreneurs in setting up industrial plants manufactured in Japan. There are Japan Engineering Centers of Japan Trade Centers operating in most of the developing countries. These Trade Centers are manned by technical persons who can readily demonstrate and provide service to the end-user industries in their respective territories.

vii) Japan has the unique advantage of having a well established overseas net-work of trading houses apread all over the world and handling every conceivable item. The two major traders, Mitsubishi Shoji Kaisha and Mitsui & Company, both registered sales around US $ 2,407.5 million last year. About 5,200 firms in Japan specialise in trading, and between them they handle 72 per cent of all Japan's exports and 80 per cent of her overseas purchases. However, as in so many Japanese industries, most of the firms - 98% - are small, employing an average of under 10 workers each. About 130 of the total number of trading firms could be classed as medium sized, employing an average of 180 workers in, say, six branch offices.

At the top of the scale, however, are 12 giant companies, employing thousands of workers each. These firms enjoy the lion's share of the trading industry's business, accounting for 60 per cent of Japan's total export trade and 68 per cent of all imports, as well as about 20% of the domestic wholesale trade. Mitsui advertise that they themselves handle 11 per cent of Japan's exports and 12 per cent of her imports; they have 43 branches in Japan and 100 in 61 foreign countries.

viii) Every individual manufacturing unit in Japan is intensively export-oriented. Knowing that the home market is limited, and thay they (and their economy in its turn) have to import a large number of essential raw materials for the smooth running of industry, it has become incumbent upon them to look at the whole world as their market. Japanese manufacturers produce not only for the Japanese market alone but for the entire world at large. Manufacturers keep a continuous watch over international developments and shifts in market position. The knowledge about shifts in the market positions overseas is continuously updated through the use of well-established overseas trading net-works operated by the Japanese Trading Houses. Whenever an opportune time to enter any particular market arises, they attack that market with all their resources, in terms of initial concession in price vis-a-vis terms of sale, organising and participating in exhibitions, trade fairs, and field contacts. In general, Japanese enter a new market at rock bottom prices, and then gradually raise their prices to a remunerative level. In Australia, Japanese machine tool manufacturers made an entry following their participation in the Sydney Exhibition in 1961 and within seven years, they have managed to get as much as a 15 per cent share of the total machine tool imports into Australia. Since then, they have raised their prices by as much as 40 per cent of the entry prices.

ix) The approach of Japanese machine tool manufacturers in marketing their products overseas is to avoid spreading their export effort too thin all over. They rightly prefer to concentrate upon selected prospective markets. Many of the machine tool manufacturers and leading exporters have concentrated sales effort in selected markets mostly in the U.S.A.

x) Japanese manufacturers do all that they can to ensure the high standards of quality. Quality consciousness and initiative to achieve excellence constitute a distinguishing characteristic of any Japanese manufacturer. As a policy, manufacturers would not attempt overseas sale of their products till they have developed it to an internationally acceptable standard. This is one of the main reasons why many of the small manufacturers generally resist the temptation to sell abroad.

Prior to shipping a single machine to any destination, manufacturers do their best to ensure that the customer would get the requisite service and help in erecting and commissioning the machine and necessary follow-up thereafter. They organise the servicing facilities through overseas branches of the Japanese trading house with specialised service personnel.

As a policy, most Japanese manufacturers ensure that the service engineers have sufficient "on-the-shop experience" and vice-versa. To that end, they rotate "on-the-shop" engineers and "in field" engineers periodically nearly every three years. This means that improved and sustained feed-back from export markets is regularly provided to the manufacturing unit. The field force in turn possesses requisite manufacturing insight.

xi) The charts 1 and 2 show how manufacturers organise and channel overseas sales. Normally, the overseas Sales Section for machine tools is the responsibility of the Overseas Sales Division of the business combine of which the particular machine tool manufacturing plant is a constituent unit. Within the Machine Tool section, they have organised units for overall overseas sales and special sub-units for specific types of machines. At times, the Overseas Sales Division has territorial departments with specialists dealing with machine tools. Such an elaborate selling organisation ensures that both selected markets as well as selected product lines get specific attention, and that concentrated efforts are put on more promising markets and product lines.

xii) As regards distribution channels used by the Japanese, commercial transactions are routed through Japanese export agents. The Japan office of the trading house undertakes complete responsibility for shipping and negotiation of documents. They get ex-factory delivery from the manufacturer. In consideration of these services the Japan office of the trading firm appropriate about 5 to 7 per cent of f.o.b. value. Import procedures and formalities on the other end in the country of import, are usually the responsibility of the overseas branch of the Japanese trading house. At times, when import licences in the country of import is not issued to the overseas branch of Japanese trading house, but direct to the dealer and end-user, import formalities are completed by the latter. However, the liaison services of the overseas branch of the Japanese Trading House, is made available. The Overseas branch of the trading house is entitled to 10 per cent of c.i.f. value as commission. The overseas branch of the trading house appoints required number of dealers in different areas through whom the business is negotiated up to the end-users. These dealers, e.g., in the U.S.A., are allowed 20 per cent commission on their turn-over. This, however, has been reported to be double the commission that U.S. dealers charge for marketing domestic machine tools. Alongside this channel, the manufacturers frequently have their own overseas offices in major markets for necessary liaison with the overseas branch of the Japanese trading house vis-a-vis dealers and end-users. This office, however, confines itself to provide pre-sale and after-sale service either independently or jointly with the overseas branch of the Japanese trading house. As a whole, manufacturers' overseas office backs and supports the efforts of the trading house. In appointing dealers, Japanese manufacturers and export houses look for the financial integrity, selling ability and technical experience of the personnel serving for dealers.

On an average, prices charged to the end-user in the importing country is about 80 per cent above the f.o.b. Japan price. The difference is accounted by commissions as described above plus freight, insurance, handling, warehousing and duty.

xiii) When the Japanese participate in exhibitions, they select exhibits which have export potential in the target country, and not just whatever they manufacture. They take special care and make extra effort to see that a product on display is given an extra finish as it is for display. Added to that is the care they take, and the politeness with which they invite and treat prospective customers and the labour they put in in demonstrating distinguishing features of their product. Table 11 gives an idea about the advertisement expenditure by two leading manufacturers/exporters during the past 3 years.

It would be observed from the table that exhibition and trade fairs is the single most important media used by the Japanese. Added to that would be personal follow-up with the help of attractive catalogues, leaflets and other promotional materials. Comparatively little stress has been laid on press advertising. Their selling approach

Table 11

Typical Overseas Advertising and Sales Promotion Budgets
(Value in 100 US $)

Heads	1965 Firm A	%	1965 Firm B	%	1966 Firm A	%	1966 Firm B	%	1967 Firm A	%	1967 Firm B	%
Advertisement	227	38	103	36	80	18	141	20	119	32	152	21
Catalogues and Leaflets	169	29	-	-	157	36	-	-	142	30	-	-
Other Promotional Material	8	1	147	50	-	-	262	38	-	-	249	34
Exhibits Fairs	83	14	-	-	44	10	-	-	51	14	-	-
Demonstrations	-	-	43	14	-	-	287	42	-	-	304	45
Training Programme	6	1	-	-	6	1	-	-	6	1	-	-
Other Promotions	101	17	-	-	154	35	-	-	60	23	-	-
	594	100	293	100	441	100	690	100	378	100	705	100
Sales	N.A.		57872		N.A.		72839		N.A.		10015	
Exports	N.A.		N.A.		N.A.		N.A.		N.A.		N.A.	
% of Sales*	N.A.		0.5		0.5		1		N.A.		0.7	

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* Ratio of overseas A & P Budget to exports would be more meaningful, but for want of comparative data.

therefore, primarily consists of demonstrating and displaying in a superb way, passing information to the customer through attractive catalogues and following up by personal contacts.

Japanese machine tool manufacturers do not have a "sell and forget" policy. Once they have sold the machine, they follow it by regular visits and provide necessary service to the customer whenever needed. This has the cumulative effect that the useful feed-back from the customer is regularly passed on to the plant. The clients also appreciate the prompt and good service provided. Prompt attention to customers makes all the difference in getting future business from him. It is interesting to note that leading manufacturers carried out what they call "research on Delivered machine" which provides guidelines for their research and development programmes.

5.3.2 Environmental Factors

i) A healthy and stable economy breeds a healthy export sector. The ability of any industry to compete in world markets to a great extent, depends upon, inter-alia the economic, social and political environment in which it operates. Costs of input and labour, productivity and managerial efficiency are vitally influenced in their turn by the existing structure of the economy and the trend of changes therein. The political and economic stability within which the Japanese Machine Tool Industry operates has been an important factor contributing toward its ability to compete in the world market and thereby enable its extra-ordinary accomplishments in the export front.

ii) The positive Government policy of assisting machine tools industry inter-alia other industries to grow and the buoyant economy that provided a fast expanding domestic market has been a major factor for the rapid development of the Japanese machine tool industry. The Japanese Machine Tool Industry has developed on the strength of growing domestic demand and not on its market prospects overseas. However, the demand for machine tools within Japan, as anywhere else, fluctuates with general economic and investment trends and the growth of engineering industries. Japan's Machine Tool Industry has found its export market an useful means of overcoming slumps in domestic consumption. In the years when domestic demand has fallen, exports have shown a timely increase to cover the gap and vice-versa. It is on this ground that the industry has been selling machine tools overseas at a lower margin of profits, 4 to 5 per cent as compared to 10 to 15 per cent on domestic sales.

iii) The success of Japan in accomplishing a sizable exports in consumer durables like transistors, T.V. sets, cameras, electricals and opticals have had an impact on the world outside in projecting Japan's image of manufacturing quality products at competitive prices. Since Japan's cameras, T.V. sets, transistors, and scores of other consumer durables have penetrated most homes in most of the countries of the world and have got a reputation for high quality. Japan has an established image of being industrially advanced. Such an image is useful for selling technical products like machine tools.

iv) Japan's foreign policy and its relations with the world outside have been conducive to the growth of her exports all round. During 50's and 60's she has built up cordial trade relations with most of the countries in the world including the Communist Bloc, the U.K. and the Continent. It is interesting to note here, that export of machine tools to Communist China from Japan in 1967 was US $ 2.2 million, slightly higher than her exports to Australia and Canada and double her exports to the E.E.C.

v) Sometimes it is said that labour in Japan is cheap and hence Japan has a competitive advantage over other countries. Table 12 shows that while the wage level in Japan is lower than that of Canada, Germany, U.K. and U.S.A., it is almost five times higher than that of India.

Table 12

Wages in Manufacturing Industries in Principal Countries

Country		1958 $	1964 $
Canada	..	570	758
Germany	..	208	380
India	..	21	25
Japan	..	81	144
U.K.	..	377	420
U.S.A.	..	734	950

Source: "Growth of Japanese Trade", an article by Rikhab Chand Jain, The Financial Express, 5th October 1967

Table 13 gives 1966 ruling wages in Machine Tool Industry in Japan.

Table 13

Wage Rates in Machine Tool Industry in Japan 1966

Age	Engineer	$ per day worker
15	-	1.8
20	3.4	2.7
30	6.8	4.7
40	12.0	7.0
50	19.5	9.0

Table 14 shows the trend in Employment and wage indices of Japan.

6. Prospects for Indian Machine Tools

6.1 Japanese Machine Tools Industry and Prospects for Indian Exports

The Japanese Machine Tool Industry is much more advanced technologically than the Indian Machine Tool Industry. Further the cost of production of Japanese machine tools is lower than that of the Indian machine tools. The overall efficiency of the Japanese industrial complex from which the machine tool industry gets most of its inputs, high levels of managerial efficiency and labour productivity are the most important factors contributing toward the competitiveness of the Japanese machine tool industry.

Although Japan is the second biggest machine tool importing country in the region, structural differences between the product range of the Indian machine tool industry and import structure of the

Table 14

Employment and Wage Indices (1965 = 100)

Year	Regular Employment Indices				Actual Wage Indices	
	Machine Manufacturing	Electric Machinery Equipment Manufacturing	Transport Equipment Manufacturing	Precision Instrument Manufacturing	All Industries	Manufacturing
1958 Average	51.5	42.2	55.8	54.6	76.3	75.4
1959	58.4	53.3	59.8	63.7	80.1	80.1
1960	73.3	72.3	68.4	70.8	82.6	83.5
1961	85.6	86.8	79.8	80.0	87.3	88.4
1962	94.6	94.1	86.3	88.6	90.1	90.6
1963	96.7	94.8	87.3	95.8	92.7	93.0
1964	100.7	100.7	94.6	99.1	98.7	99.0
1965	100.0	100.0	100.0	100.0	100.0	100.0
1966	96.1	99.7	103.1	97.4	105.4	106.2

Source of Data: Research Department Data for the Labor Ministry.

Japanese industry make this market inaccessible to India. Indian Machine Tool Manufacturers are not producing the types of machines that are imported into Japan. The sort of machine tools India can presently offer to Japan are being manufactured locally in abundance, and are even being exported from Japan on a substantial scale. As such immediate possibilities of exports of Indian Machine tool to Japan are negligible.

6.2 Prospects for India

The overall assessment of the Japanese market is that it is not open to Indian machine tool manufacturers in the foreseable future.

However, at times Japan has imported machine tools of types produced domestically where delivery period of local manufacturers was long. Thus there is some scope for Indian machine tool manufacturers to get a minute fraction of Japanese imports by offering more convenient delivery terms than those offered by local manufacturers. However, this small opening does not provide adequate justification for full scale marketers' efforts in Japan, and casual efforts would be of no avail. However, what is wanted by any customer in such cases is good quality plus convenient delivery terms; the latter alone is never adequate to get the sale. Above all, the ability of Indian manufacturers to offer and adhere to more competitive delivery terms than local manufacturers in Japan is open to serious doubts. Japanese machine tool manufacturers presently offer delivery terms varying from 6 to 8 weeks for lathes, turret lathes, milling machines and other simple types of standard machine tools. For overseas buyers their delivery time is as long as 30 to 35 weeks in case of standard machines and as long as 40 to 45 weeks in case of special purpose machines.

Since imports of industrial machinery vis-a-vis machine tools into India from Japan is quite substantial, efforts should be made to enter into reciprocal deals with the Japanese Industry. Under reciprocal deals India can import her requirements of sophisticated lines of industrial machinery, ships and machine tools from Japan and pay for these by exporting simple low technology manufactures including machine tools (at least those made in India under Japanese licences, like Hitachi Turret Lathes). This is the only plausible entry to the Japanese market.

Production, Export and Import Trends of Selected Industrial Machinery
(Thousand US $)

Year	Machinery Products Metal working	Construction machinery	Chemical machinery	Machine tools	Mining	Total* including others
PRODUCTION						
1957	75,019	36,036	139,139	43,192	16,958	78,339
1960	133,006	130,256	316,547	125,469	18,367	193,994
1962	209,447	249,067	528,347	280,256	22,236	239,447
1963	150,650	300,444	582,831	264,256	19,401	318,378
1964	192,742	332,275	752,289	252,517	25,869	246,897
EXPORT						
1957	2,467	2,764	2,500	2,011	2,103	19,625
1960	3,367	8,800	6,081	4,511	3,367	44,875
1962	8,953	9,614	33,914	7,186	6,294	103,378
1963	11,586	15,147	16,094	11,938	4,428	95,392
1964	17,336	17,761	40,031	18,081	5,261	153,161
IMPORT						
1957	15,169	9,694	11,694	33,892	1,989	106,195
1960	30,536	8,389	10,719	54,725	2,469	130,936
1962	51,033	5,211	22,431	132,176	2,567	281,467
1963	45,692	4,689	20,572	63,322	2,153	232,222
1964	34,822	5,528	26,292	59,129	4,291	195,183

* Includes pumps, compressors, transport machinery, crushing machinery and others.

Source: Industry in Japan, Ministry of International Trade and Industry, Nov 1965, p.36. As a whole, however, the total exports of engineering products of Japan exceed total imports (in 1962, 1963, 1964 and 1965): Year Book of International Trade Statistics, United Nations, 1965.

Establishments, Employees and Shipment of All Industries and Engineering Industries

(Value in Yen)

	All Industries(A)			Engineering Industries(B)			B/A (%)		
Year	Number of Enterprises	Number of Employees (1000 persons)	Value of Shipments (1,000,000)	Number of Enterprises	Number of Employees (1000 persons)	Value of Shipments (1,000,000)	Number of Enterprises	Employees	Value of Shipments
1935	84,625	2,620,178	10,815	10,250	403,601	1,359	12.1	15.4	12.6
1940	137,142	4,485,584	27,092	24,804	1,450,213	8,443	18.1	32.3	32.6
1945	57,980	2,210,197	43,966	13,262	761,887	22,569	22.9	34.5	51.3
1950	156,223	3,860,614	2,294,333	20,969	812,904	324,453	13.4	21.1	14.1
1955	187,101	4,958,038	6,561,887	23,559	992,127	1,880,058	12.6	20.0	28.7
1960	238,320	7,621,274	15,270,067	36,873	2,034,673	2,830,179	15.5	26.7	18.5
1962	248,786	8,445,306	20,560,583	40,565	2,379,259	5,890,398	16.3	28.2	28.8
1963	51,688	6,435,984	19,881,279	12,586	2,095,956	5,855,695	24.3	32.6	29.5
1964	52,021	6,652,643	23,200,425	12,682	2,093,044	6,891,547	24.4	31.5	29.7
1965	52,449	6,645,668	24,672,603	12,466	2,159,886	7,191,448	23.8	32.5	29.1

Source: The Ministry of International Trade and Industry, "Industrial Statistics", "Quick Report of Industrial Statistics" and "Industrial Statistics 50 Years".

NOTES:
(1) 1939 - '49 ... Enterprises with employees over five persons were investigated.
(2) 1950 - '62 ... Enterprises with employees over four persons were investigated.
(3) 1964 - '65 ... Enterprises with employees over thirty persons were investigated.
(4) Value of shipments column before 1949 represents production value.
(5) 1929 - 1965 "Machine Industry" comprises machinery manufacturing, electric machineries manufacturing, transport equipment manufacturing, precision instruments manufacturing and ordnance equipment.

Japan: Index Number of Industrial Production

Year	General	Manufacturing	Iron & Steel	Machinery	Ceramics Cement & Glass	Chemicals	Petroleum & Coal Products	Rubber	Paper & Pulp	Textiles	Food & Beverages
1935	28.7	27.9	19.5	9.0	33.8	22.9	11.8	26.6	19.0	70.0	57.5
1945	20.5	19.6	13.1	16.4	8.5	10.8	5.8	5.8	5.0	5.5	20.3
1950	23.0	20.4	22.9	11.9	26.2	20.8	11.1	26.0	21.4	26.4	33.5
1955	47.4	45.7	43.8	28.5	51.2	49.5	39.7	40.5	53.4	62.0	77.4
1962	129.1	130.1	125.5	145.0	126.9	130.0	135.0	126.4	122.1	113.5	117.2
1963	142.1	143.7	140.4	159.5	136.0	152.7	159.8	135.8	135.3	122.5	121.0
1964	166.2	169.1	172.8	194.0	155.6	178.9	184.5	143.8	153.0	136.9	127.8
1965	174.1	177.2	177.7	198.8	159.5	208.0	209.7	140.0	153.2	147.1	134.4
1966	194.8	198.7	204.7	227.1	174.3	236.3	242.1	151.0	169.9	162.6	137.9

Source: Ministry of International Trade and Industry, Japan

Japan : Engineering Industries, 1963

(Value in Million Yens)

Economic Sector	Shipment		Establishments		Persons Employed		Value Added in process of manufacture	Percentage of Value Added in process of manufacture
	Value	Percentage	Number	Percentage	Number	Percentage		
Manufacturing$^{(a)}$ of which	22,353,900		147,783		8,093,408		7,429,495	-
Engineering industries	5,722,465	(25)	49,923	(33.8)	3,704,362	(45)	3,004,241	(40)
1. Fabricated Metals	966,913	16.9	12,796	25.6	497,316	13.4	404,774	13.5
2. Machinery except Electrical	1,890,661	33.0	13,830	27.7	833,507	22.5	782,625	26.0
3. Electrical Machinery, Equipment and Supplies	1,952,500	34.1	7,687	15.4	817,699	22.1	780,142	25.9
4. Transport Equipment	1,013,114	17.0	5,126	10.3	569,723	15.4	682,209	22.7
5. Precision Instruments	297,096	5.2	2,561	5.1	167,746	4.5	127,749	4.3
6. Ordnance and Accessories	1,839	0.3	13	0	1,128	0	809	7.5
7. Others	613,456	10.7	7,920	15.9	319,927	8.6	225,933	-
		100.0		100.0		100.0		100.0
Total engineering industries including basic metal industries	8,659,699	(38.7)	55,838	(37.8)	4,343,380	(53.0)	3,066,794	(49.4)

Source: Census of Manufacturing, 1962; Report by Industries, Dec 1964; Research and Statistics Division, Minister's Secretariat, Ministry of International Trade and Industry.

NOTE: (a) Establishment employing ten or more persons. Japan Statistics Year Book 1965, Bureau of Statistics, Office of the Prime Minister.

Appendix - 5

Japan : Export and Import of Engineering Products

(US $ Millions, FOB)

	1962						1963					
Products	Export	Index Base 1965=100	% of Total	Import	Index Base 1965=100	% of Total	Export	Index Base 1965=100	% of Total	Import	Index Base 1965=100	% of Total
Total Engineering Products	1,252	47.0	100.0	770	117.0	100.0	1,495	56.6	100.0	808	122.7	100.0
Machinery Other than Electric	345	55.3	27.8	572	137.5	74.3	351	56.3	23.5	574	137.9	71.0
Electric Machinery	429	55.4	36.5	81	81.2	10.5	519	66.9	34.7	107	108.1	13.2
Transport Equipment	478	38.5	38.5	117	81.8	15.2	625	50.3	41.8	128	89.5	15.3

	1964						1965					
Products	Export	Index Base 1965=100	% of Total	Import	Index Base 1965=100	% of Total	Export	Index Base 1965=100	% of Total	Import	Index Base 1965=100	% of Total
Total Engineering Products	1,957	74.1	100.0	825	125.4	100.0	2,642	100.0	100.0	658	100.0	100.0
Machinery Other than Electric	481	77.1	24.6	546	131.3	6.2	624	100.0	23.6	416	100.0	63.2
Electrical Machinery	638	82.3	32.6	117	118.2	14.2	775	100.0	29.3	99	100.0	15.0
Transport Equipment	839	67.5	42.9	162	113.3	19.6	1,243	100.0	47.0	143	100.0	21.7

Source: Year Book of International Trade Statistics, 1964. United Nations; Bulletin of Statistics and World Trade of Engineering Industries, 1965 (ST/ECE/Eng/4).

Demand, Production Import, Export, Stock and Domestic Consumption of Lathes

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	2.5	100	71.4	2.1	100	60.0	0.5	100	14.3	0.6	100	17.1	24.0	3.0	3.5	100	140.0
1960	41.9	1,676	83.0	9.9	471	19.6	1.1	220	2.2	0.8	133	1.6	1.9	0.2	50.5	1,443	120.5
1961	85.3	3,412	99.0	23.0	1,095	26.7	2.0	400	2.3	20.9	3,483	24.2	24.5	2.9	86.2	2,463	101.1
1962	97.6	3,904	69.3	31.6	1,505	22.4	2.2	440	1.6	7.0	1,167	5.0	7.2	0.9	140.9	4,026	144.4
1963	96.2	3,848	90.1	13.9	662	13.0	3.5	700	3.3	6.8	1,133	6.4	7.1	0.8	106.8	3,051	111.0
1964	89.7	3,588	92.9	12.1	576	12.5	5.6	1,120	5.8	6.4	1,067	6.6	7.1	0.9	96.6	2,760	107.7
1965	61.4	2,456	106.8	7.9	376	13.7	7.6	1,520	13.2	10.2	1,700	17.7	16.6	2.0	57.5	1,643	93.6
1966	72.0	2,880	112.0	2.7	129	4.2	16.3	3,260	25.3	4.3	717	6.7	6.0	0.7	64.3	1,837	89.3

Appendix 6 (cont'd)

Demand, Production, Import, Export, Stock and Domestic Consumption of Drilling Machines

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As no. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	1.4	100	127	0.1	100	91	0.2	100	18	0.2	100	18	14	1.8	1.1	100	78
1960	12.5	893	99	0.6	600	4	0.5	250	4	0.2	100	2	2	0.5	12.6	1,145	101
1961	21.6	1,542	92	1.8	1,800	8	0.6	300	3	0.6	300	3	3	0.3	23.4	2,127	108
1962	24.1	1,721	99	1.4	1,400	6	0.6	300	2	1.2	600	5	5	0.6	24.3	2,209	101
1963	16.3	1,164	99	0.7	700	4	1.0	500	6	0.7	350	4	4	0.5	16.5	1,500	101
1964	17.4	1,242	108	0.8	800	5	1.1	550	7	1.7	850	11	10	1.2	16.1	1,463	93
1965	12.5	893	107	0.7	700	6	1.8	900	15	1.4	700	12	11	1.3	11.7	1,063	94
1966	14.4	1,028	106	1.0	1,000	7	2.6	1,300	19	0.6	300	4	4	0.6	13.6	1,236	94

Demand, Production, Import, Export and Domestic Consumption of Boring Machines

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	1.1	100	52.4	1.4	100	66.7	0.1	100	4.8	0.3	100	4.2	27.0	0.3	2.1	100	190.9
1960	9.9	900	57.6	8.6	614	50.0	0.9	900	5.2	0.7	233	4.1	7.0	0.8	17.2	818	173.7
1961	10.1	1,736	57.8	15.2	1,086	46.2	0.9	900	2.7	1.1	366	3.3	5.8	0.7	33.0	1,571	172.7
1962	33.2	3,120	74.8	20.8	1,486	44.2	0.8	800	1.7	9.3	3,097	19.7	26.4	3.2	47.0	2,237	133.5
1963	28.2	2,563	84.1	5.5	393	16.4	2.6	2,660	7.7	6.9	2,298	20.7	24.5	2.5	33.5	1,594	118.8
1964	23.6	2,145	102.6	4.6	328	20.0	3.3	3,300	14.3	8.8	2,930	38.2	37.3	4.5	23.0	1,095	97.4
1965	17.6	1,600	100.0	3.3	234	18.9	4.1	4,100	23.3	8.0	2,664	45.4	45.5	5.4	17.6	838	100.0
1966	10.0	909	80.0	1.1	78	8.8	5.3	5,300	42.4	10.3	3,430	82.4	103.0	13.2	12.5	595	125.0

Appendix 6 (cont'd)

Demand, Production, Import, Export, Stock and Domestic Consumption of Milling Machines

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	1.1	100	68.8	1.2	100	75.0	0.4	100	25.0	0.7	100	43.8	63.6	7.5	1.6	100	145.4
1960	15.5	1,391	76.8	5.6	466	28.1	0.6	150	2.5	1.1	152	4.3	7.1	0.8	19.9	1,244	130.0
1961	28.0	2,545	70.2	12.5	1,041	31.4	0.9	225	3.8	1.0	143	2.5	3.5	0.4	39.8	2,481	142.2
1962	38.9	3,536	70.9	18.3	1,524	33.4	1.1	275	2.0	2.3	329	4.2	5.9	0,7	54.8	3,419	140.9
1963	36.4	3,309	81.2	9.7	808	21.6	1.5	375	3.3	2.1	300	4.6	5.8	0.7	44.8	2,806	123.0
1964	34.5	3,136	84.6	9.2	766	22.4	2.8	700	6.8	2.2	314	5.3	6.4	0.8	40.8	2,563	118.1
1965	25.5	2,318	143.7	3.8	317	15.3	3.9	975	15.7	2.9	415	11.7	11.5	1.4	24.7	1,544	96.8
1966	29.6	2,691	107.2	4.0	333	14.5	7.4	1,850	26.9	1.5	214	5.4	5.1	0.6	27.6	1,719	93.2

Demand, Production, Import, Export, Stock and Domestic Consumption of Planers

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	0.1	100	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1960	1.5	1,607	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1961	3.8	4,156	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1962	7.5	8,089	115.3	9.5	-	146.2	0.1	-	1.5	0.4	-	6.2	5.2	-	16.5	-	220
1963	8.7	9,459	74.4	3.3	-	28.2	0.1	-	0.9	0.6	-	5.1	6.8	-	11.7	-	134
1964	4.5	4,831	80.4	2.2	-	39.3	0.1	-	1.8	1.6	-	28.5	35.5	-	5.6	-	124
1965	3.1	3,342	119.2	0.2	-	7.7	0.3	-	11.5	2.0	-	76.9	64.5	-	2.6	-	84
1966	2.3	2,500	92.0	0.1	-	4.0	0.3	-	12.0	1.6	-	64.0	69.5	-	2.5	-	109

Demand, Production, Export, Stock and Domestic Consumption of Grinders

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	1.82	100	48.9	2.4	100	64.6	0.2	100	5.3	0.3	100	0.8	16.4	2.4	3.72	100	204.3
1960	19.3	1,061	59.8	14.2	589	43.6	0.3	150	0.9	1.0	334	3.1	5.1	0.6	32.5	874	168.4
1961	31.0	1,705	56.2	25.2	1,048	45.6	0.5	250	0.9	1.3	467	2.3	4.2	0.5	55.2	1,485	178.1
1962	40.1	2,206	72.2	24.8	1,031	44.7	1.3	6,500	2.2	3.4	1,169	6.1	8.4	1.1	55.5	1,493	138.4
1963	36.2	1,991	74.7	14.3	595	29.4	1.6	8,000	3.3	3.8	1,303	7.8	10.5	1.3	48.5	1,305	133.9
1964	34.7	1,909	77.5	13.6	565	30.4	3.0	15,000	6.7	4.4	1,503	9.8	12.8	1.5	44.7	1,202	128.9
1965	25.4	1,397	84.7	9.7	404	32.3	4.4	22,000	14.6	5.1	1,737	16.9	20.1	2.4	30.0	807	118.0
1966	28.7	1,579	98.9	4.1	171	14.1	5.2	26,000	17.8	3.7	1,269	12.8	12.9	1.5	29.0	780	101.0

Demand, Production, Import, Export, Stock and Domestic Consumption of Gear Cutting Machines

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=-100)	As % of production
1955	0.43	100	22.2	2.1	100	77.8	0.1	100	3.7	0.1	100	3.7	10.3	1.2	2.55	100	450.0
1960	4.6	1,069	38.3	7.5	357	62.5	0.1	100	0.8	0.1	100	0.8	1.3	0.1	12.0	480	260.8
1961	6.6	1,535	33.0	13.9	662	68.5	0.3	300	1.4	0.1	100	0.3	1.0	0.1	20.2	808	302.9
1962	9.3	2,162	34.9	18.0	857	67.6	0.2	300	0.7	0.6	600	2.8	6.2	0.7	26.6	1,064	286.0
1963	10.1	2,348	56.3	8.9	424	49.2	0.4	400	2.2	1.2	1,200	6.6	12.0	1.5	18.0	724	177.4
1964	10.1	2,348	52.1	10.3	490	53.6	0.7	700	3.6	1.6	1,600	8.3	16.5	1.9	19.3	772	192.0
1965	7.3	1,697	50.3	7.9	370	54.5	0.5	500	3.5	1.8	1,800	12.4	25.0	3.0	14.5	580	198.6
1966	6.9	1,604	57.9	5.1	243	42.8	0.9	900	7.6	1.0	1,000	8.4	14.2	1.7	11.9	476	172.4

Demand, Production, Import, Export, Stock and Domestic Consumption of other Machines

Year	Production			Import			Export			Stock					Domestic Consumption		
	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	Value in US $ (Million)	Index (Base 1955=100)	As % of domestic consumption	As % of production	As No. of monthly production	Value in US $ (Million)	Index (Base 1955=100)	As % of production
1955	1.43	100	60.0	1.9	100	76.0	0.7	100	28.0	0.2	100	8.0	10.5	1.2	2.43	100	81.4
1960	11.0	785	58.2	8.7	457	46.5	0.9	128	4.3	0.2	100	1.1	2.2	0.2	18.8	783	80.3
1961	16.9	1,206	54.7	15.9	836	51.4	1.7	242	5.4	0.5	250	1.6	2.9	0.3	30.8	1,283	182.5
1962	17.9	1,278	72.7	8.5	447	34.7	0.9	128	3.6	1.4	700	5.7	7.8	1.0	24.6	1,025	138.1
1963	18.7	1,335	76.9	6.7	358	27.6	1.3	185	5.3	1.2	600	5.0	6.6	0.8	24.3	1,012	129.9
1964	20.0	1,428	80.6	6.7	352	27.1	1.5	214	6.1	1.6	800	6.5	7.9	0.9	24.8	1,033	71.7
1965	15.0	1,071	82.7	5.1	268	28.4	2.2	314	12.3	1.4	700	7.8	9.2	1.1	18.1	754	120.8
1966	17.5	1,250	94.1	2.8	147	15.0	2.2	314	11.7	0.9	450	4.8	5.1	0.6	18.6	775	105.7

Japan : Production of Machine Tool by Machine Types 1955-66

Name of Machines	1955 Nos.	1955 Value in US $ (Million)	1955 Average value US $	1960 Nos.	1960 Value in US $ (Million)	1960 Average value US $	1961 Nos.	1961 Value in US $ (Million)	1961 Average value US $	1962 Nos.	1962 Value in US $ (Million)	1962 Average value US $
ALL MACHINES	17,835	9.88	554	78,057	116.0	1,486	108,635	212.3	1,954	105,004	270.6	2,577
LATHES	1,011	2.5	2,473	16,097	41.9	2,597	33,299	85.3	2,565	29,393	97.6	3,315
Engine Lathes	231	0.8	3,463	6,990	19.5	2,790	17,887	44.4	2,482	13,573	43.2	3,183
Swing over Bed upto 400 mm	-	-	-	-	-	-	-	-	-	-	-	-
Swing over Bed upto 1000 mm	-	-	-	-	-	-	-	-	-	-	-	-
Swing over Bed over 1000 mm	-	-	-	-	-	-	-	-	-	-	-	-
Copying Lathes	63	0.4	6,349	812	6.1	7,512	1,519	9.7	6,386	1,805	11.5	6,371
Bench & Bench Turret Lathes	191	0.1	524	3,254	0.5	154	4,950	0.8	162	4,491	0.8	178
Turret Lathes	100	0.3	3,000	1,705	4.8	2,815	3,225	9.3	2,884	3,643	14.0	3,843
Automatic Chucking and Screw Machines	315	0.3	952	2,777	5.7	2,053	4,395	10.0	2,275	4,497	11.1	2,468
Vertical Boring and Turning Mill	-	-	-	105	3.4	32,381	199	6.0	30,151	284	9.5	33,451
Other Lathes	111	0.6	5,405	454	1.9	4,185	1,124	5.1	4,537	1,100	7.5	6,818
DRILLING MACHINES	11,817	1.4	118	42,330	12.5	2,955	52,803	21.6	409	44,876	24.1	538
Upright	990	0.4	400	3,728	2.5	671	5,262	3.7	703	5,271	4.2	797
Radial	23	0.2	8,696	664	4.7	7,078	1,408	10.7	7,599	1,789	14.1	7,882
Multi-spindle	-	-	-	589	2.3	3,905	726	2.9	3,995	594	2.0	3,367
Bench Drilling	10,674	0.6	56	36,840	2.3	62	44,807	3.1	69	36,930	2.5	68
Other Drilling Machines	130	0.2	1,539	509	0.7	1,375	600	1.2	2,000	292	1.3	4,452

	1963			1964			1965			1966		
Name of Machines	Nos.	Value in US $ (Million)	Average value US $	Nos.	Value in US $ (Million)	Average value US $	Nos.	Value in US $ (Million)	Average value US $	Nos.	Value in US $ (Million)	Average value US $
ALL MACHINES	125,043	250.8	2,006	130,322	234.5	1,799	88,606	167.8	1,894	106,364	190.4	1,790
LATHES	32,300	96.2	2,978	35,955	89.7	2,495	23,433	61.4	2,620	25,847	72.0	2,786
Engine Lathes	15,850	47.2	2,978	17,296	49.0	2,833	11,231	33.0	2,938	12,481	39.6	3,173
Swing over Bed upto 400 mm	-	-	-	-	-	-	5,498	10.5	1,910	5,151	9.5	1,844
Swing over Bed upto 1000 mm	-	-	-	-	-	-	5,704	21.2	3,717	7,292	29.0	3,977
Swing over Bed over 1000 mm	-	-	-	-	-	-	29	1.3	44,828	38	1.1	28,947
Copying Lathes	1,498	9.5	6,342	1,061	7.0	6,598	530	3.7	6,981	472	2.8	5,932
Bench & Bench Turret Lathes	5,068	1.0	197	5,568	1.2	216	4,277	0.9	210	2,891	1.0	346
Turret Lathes	3,246	11.3	3,481	3,089	8.0	2,881	1,502	4.5	2,996	2,175	6.8	3,126
Automatic Chucking and Screw Machines	4,638	9.5	2,048	6,547	14.4	2,200	4,278	11.3	2,641	6,327	16.0	2,529
Vertical Boring and Turning Mill	219	10.0	45,662	181	4.3	23,757	152	4.1	26,974	98	2.3	23,469
Other Lathes	1,781	7.7	4,323	2,213	4.9	2,214	1,463	3.9	2,666	1,403	3.5	2,495
DRILLING MACHINES	49,241	16.3	331	59,915	17.4	291	38,746	12.5	323	48,884	14.4	295
Upright	5,491	3.8	692	6,134	4.6	750	3,789	3.1	818	4,413	3.4	771
Radial	1,216	6.5	5,345	1,528	6.1	3,992	859	4.9	5,704	1,167	6.1	5,227
Multi-spindle	635	1.8	2,835	540	1.8	3,333	289	1.3	4,498	287	1.1	3,833
Bench Drilling	41,000	2.8	68	50,298	3.4	68	33,105	2.4	72	41,629	3.2	77
Other Drilling Machines	899	1.4	1,557	1,415	1.5	1,060	704	0.8	1,136	1,388	0.6	432

Appendix 7 (cont'd)

Name of Machines	1955			1960			1961			1962		
	Nos.	Value in US $ (Million)	Average value US $	Nos.	Value in US $ (Million)	Average value US $	Nos.	Value in US $ (Million)	Average value US $	Nos.	Value in US $ (Million)	Average value US $
BORING MACHINES	922	1.1	1,193	905	9.9	10,939	1,332	19.1	14,339	1,789	35.2	19,676
Horizontal Boring	7	0.1	14,286	129	6.2	48,062	299	12.2	40,803	494	23.2	46,964
Table Type	-	-	-	-	-	-	-	-	-	403	13.0	32,258
Floor Type	-	-	-	-	-	-	-	-	-	91	10.2	112,088
Precision Boring	-	-	-	89	2.2	24,719	206	4.4	21,359	348	8.1	23,276
Jig Borer	7	0.1	14,286	59	0.9	15,254	69	1.4	20,290	274	3.2	11,679
Cylinder Reboring	863	0.2	232	606	0.3	495	704	0.3	426	631	0.3	475
Other Boring Machines	45	0.7	15,556	22	0.3	13,636	54	0.8	14,815	42	0.4	9,524
MILLING MACHINES	66	1.1	16,667	3,013	15.3	5,078	6,136	28.0	2,740	7,501	38.9	5,186
Bed Type	-	-	-	366	3.1	8,470	616	5.2	8,442	932	6.7	7,189
Knee Type	-	-	-	1,942	8.2	4,223	4,085	17.0		5,092	24.1	4,733
Horizontal	-	-	-	562	2.9	5,160	1,674	6.4	3,823	2,174	9.6	4,416
Vertical	-	-	-	1,380	5.3	3,841	2,411	10.6	4,397	2,918	14.5	4,969
Universal	-	-	-	272	1.1	4,044	66	0.4	6,061	100	0.7	7,000
Profile	-	-	-	-	-	-	-	-	-	75	0.7	9,333
Plano Miller	-	-	-	14	0.9	64,286	21	1.5	71,429	44	3.1	70,455
Other Milling Machines	66	1.1	16,667	419	2.0	4,773	1,348	3.8	2,819	1,258	3.6	2,862
PLANERS	8	0.1	12,500	67	1.5	22,388	233	3.8	16,309	363	7.5	20,661
GRINDERS	2,552	1.82	713	6,153	19.3	3,137	6,944	31.0	4,458	6,364	40.1	6,300
Cylindrical	-	-	-	676	5.7	8,432	1,449	11.6	8,006	1,325	11.3	8,528
Universal	39	0.2	5,128	172	1.4	8,140	287	2.0	6,969	378	2.8	7,407
Roll Grinder	8	0.3	37,500	62	2.8	45,161	43	2.6	60,465	63	4.7	74,603
Internal Grinder	3	0.02	6,667	55	0.5	9,091	219	1.6	7,306	141	1.4	9,929
Surface Grinder	55	0.2	3,636	685	3.4	4,964	1,291	5.2	4,028	1,376	9.2	6,686
Centreless Grinder	-	-	-	273	1.8	6,593	421	2.5	5,938	411	3.2	7,786
Tool Grinder	177	0.3	1,695	1,250	1.9	1,520	1,865	2.5	1,341	1,797	3.1	1,725
Other Grinders	2,270	0.8	352	2,980	1.8	604	1,369	2.9	2,118	873	4.4	5,040

Name of Machines	1963 Nos.	1963 Value in US $ (Million)	1963 Average value US $	1964 Nos.	1964 Value in US $ (Million)	1964 Average value US $	1965 Nos.	1965 Value in US $ (Million)	1965 Average value US $	1966 Nos.	1966 Value in US $ (Million)	1966 Average value US $
BORING MACHINES	1,790	28.2	15,754	1,840	23.6	12,826	1,698	17.6	10,365	1,475	19.0	12,881
Horizontal Boring	503	17.9	35,586	394	14.4	36,548	345	9.3	26,957	371	10.1	27,229
Table Type	431	11.4	26,450	311	7.5	24,116	311	6.3	20,257	334	7.0	20,958
Floor Type	72	6.5	90,278	83	6.9	83,133	34	3.0	88,235	37	3.1	83,784
Precision Boring	235	3.7	15,745	179	2.5	13,967	198	2.9	14,647	212	2.5	11,793
Jig Borer	460	5.0	10,870	490	5.2	10,612	406	4.4	10,837	407	4.7	11,548
Cylinder Boring	463	0.2	432	679	0.3	442	661	0.3	454	459	0.2	436
Other Boring Machines	129	1.4	10,853	98	1.2	12,245	88	0.7	7,955	26	1.5	57,692
MILLING MACHINES	8,524	36.4	4,270	8,488	34.5	4,065	5,898	25.5	4,323	6,764	29.6	4,376
Bed Type	1,141	6.1	5,346	929	6.1	6,566	470	3.6	7,660	670	4.2	6,269
Knee Type	5,580	21.8	3,907	5,372	20.3	3,779	3,964	16.4	4,137	4,926	18.5	3,756
Horizontal	2,695	10.1	3,748	2,477	8.2	3,311	1,796	6.5	3,619	2,042	7.3	3,575
Vertical	2,885	11.7	4,056	2,895	12.1	4,180	2,168	9.9	4,566	2,884	11.2	3,886
Universal	127	0.9	7,087	138	0.9	6,522	100	0.5	5,000	112	0.5	4,464
Profile	156	1.4	8,974	164	1.7	10,366	109	1.7	15,596	121	2.8	23,141
Plano Miller	39	2.9	74,359	41	2.3	56,098	33	1.4	42,424	39	1.5	38,462
Other Milling Machines	1,481	3.3	2,228	1,844	3.2	1,735	1,222	1.9	1,555	896	2.1	2,344
PLANERS	406	8.7	21,429	268	4.5	16,791	154	3.1	20,130	111	2.3	20,721
GRINDERS	7,315	36.2	4,962	6,728	34.7	5,155	5,675	25.4	4,475	7,321	28.7	3,920
Cylindrical	1,111	7.6	6,841	1,099	7.1	6,460	802	4.5	5,611	912	5.7	6,250
Universal	417	2.7	6,475	295	1.8	6,102	129	0.9	6,977	264	2.0	7,576
Roll Grinders	45	4.0	88,889	40	3.6	90,000	44	3.3	75,000	34	2.1	61,765
Internal Grinders	128	1.4	10,938	195	2.2	11,282	108	1.1	10,185	170	1.8	10,588
Surface Grinder	1,481	7.1	4,794	1,451	7.5	5,169	1,057	6.3	5,960	1,242	5.8	4,670
Centreless Grinder	714	4.5	6,303	745	4.4	5,906	563	3.2	5,684	661	3.3	4,992
Tool Grinders	2,244	2.9	1,292	2,015	2.8	1,390	1,850	2.4	1,297	2,088	2.5	1,197
Other Grinders	1,173	6.0	5,106	888	5.3	5,969	1,122	3.7	3,298	1,950	5.5	2,821

Name of Machines	1955 Nos.	1955 Value in US $ (Million)	1955 Average value US $	1960 Nos.	1960 Value in US $ (Million)	1960 Average value US $	1961 Nos.	1961 Value in US $ (Million)	1961 Average value US $	1962 Nos.	1962 Value in US $ (Million)	1962 Average value US $
GEAR CUTTING MACHINES	126	0.43	3,410	823	4.6	5,589	1,180	6.6	5,590	1,521	9.3	6,060
Gear Hobbing	83	0.3	3,615	385	2.6	6,753	563	4.1	7,282	776	5.3	6,830
Gear Shaping	16	0.1	6,250	252	1.1	4,365	218	1.5	6,881	406	2.7	6,650
Other Gearing Machines	27	0.03	1,111	97	0.6	6,186	211	0.6	2,844	209	0.9	4,306
Gear Grinders	-	-	-	14	0.1	7,143	-	-	-	4	0.04	10,000
Other Gear Finishing Machines	N.A.	0.2	N.A.	75	0.2	2,667	188	0.4	2,128	126	0.3	2,381
OTHER MACHINES	1,333	1.43	1,060	8,669	11.0	1,269	6,708	16.9		13,197	17.9	1,349
Broaching Machines	7	0.03	4,286	98	0.8	8,163	109	0.9	8,257	60	0.4	6,667
Shapers	79	0.1	1,266	807	1.8	2,231	1,312	2.6	1,982	1,191	2.7	2,267
Honing and Lapping Machines	-	-	-	655	0.8	1,221	1,363	1.7	1,247	1,439	2.3	1,598
Metal Sewing Machines	625	0.3	480	3,725	0.3	81	3,924	0.3	77	4,614	0.4	87
Miscellaneous	622	1.0	1,608	3,384	7.3	2,157	N.A.	11.4	N.A.	5,893	12.1	2,053

Name of Machines	1963 Nos.	1963 Value in US $ (Million)	1963 Average value US $	1964 Nos.	1964 Value in US $ (Million)	1964 Average value US $	1965 Nos.	1965 Value in US $ (Million)	1965 Average value US $	1966 Nos.	1966 Value in US $ (Million)	1966 Average value US $
GEAR CUTTING MACHINES	1,592	10.1	6,340	1,358	10.1	7,440	830	7.3	8,296	997	6.9	6,930
Gear Hobbing	948	6.8	7,173	967	7.5	7,756	610	5.0	8,197	616	4.5	7,305
Gear Shaping	347	2.3	6,628	161	1.4	8,696	134	1.3	9,702	195	1.4	7,180
Other Gear Cutting	221	0.7	3,167	89	0.5	5,618	46	0.6	13,044	71	0.5	7,042
Gear Grinders	13	0.1	7,692	19	0.2	10,526	6	0.1	16,667	25	0.2	8,000
Other Gear Finishing Machines	63	0.2	3,077	122	0.5	4,098	84	0.3	3,571	90	0.3	3,333
OTHER MACHINES	23,875	18.7	782	15,770	20.0	1,268	12,122	15.0	1,236	14,965	17.5	1,170
Broaching Machines	46	0.6	13,044	49	0.6	12,245	67	0.7	10,448	78	0.7	8,974
Shapers	7,624	3.2	420	1,146	2.4	2,094	752	1.6	2,128	797	1.6	2,008
Honing & Lapping	1,464	2.2	1,503	1,431	1.7	1,188	575	1.0	1,739	652	1.0	1,534
Metal Sewing	4,521	0.4	89	4,065	4.2	1,033	3,150	2.8	889	3,234	3.2	999
Miscellaneous	10,220	12.3	1,204	9,079	11.1	1,223	7,578	8.9	1,175	10,204	11.0	1,078

Production and Shipment of Metal Cutting Machine Tools in 1967

(Weight in ton, Value in US $)

Item of Machinery	Production		Shipment	
	Unit	Value	Unit	Value
Metal Cutting Machines	153,949	350,113,532	156,344	359,945,994
Lathes	39,260	119,208,736	39,595	121,928,158
Center Lathe	18,121	57,725,042	18,433	59,256,928
Copying Lathe	890	6,350,683	887	6,301,478
Bench Type Lathe	5,061	1,841,383	5,087	1,873,128
Turret Lathe	3,486	12,558,638	3,452	13,242,686
Automatic Lathe	9,616	31,985,781	9,473	31,349,425
Vertical Lathe	206	4,292,306	224	5,275,308
Other Lathes	1,880	4,454,703	2,039	4,629,205
Drilling Machines	65,924	22,447,542	67,429	22,925,656
Upright Drilling Machine	5,778	5,112,322	5,781	5,091,361
Radial Drilling Machine	1,889	9,918,036	1,917	10,151,600
Multi-Spindle Drilling Machine ..	567	2,233,292	556	2,245,961
Bench Drilling Machine	55,658	4,189,011	57,142	4,374,222
Other Drilling Machines	2,032	994,881	2,033	1,062,512
Boring Machines	1,914	28,835,673	1,978	29,102,911
Horizontal Boring Machine	576	17,113,831	581	17,496,294
Table Type	511	11,117,564	521	11,729,339
Floor Type	65	5,996,267	60	5,766,955
Precision Boring Machine	296	4,670,992	280	4,474,278
Jig Boring Machine	509	6,322,364	516	6,324,453
Cylindrical Boring Machine	514	245,625	562	237,239
Other Boring Machines	19	482,861	39	570,647
Milling Machines	9,647	49,195,981	9,565	50,058,461
Bed Type Milling Machine	1,416	10,069,214	1,382	9,984,914
Knee Type Milling Machine	7,132	29,484,464	7,074	29,789,603
Vertical Type	4,266	17,744,347	4,221	17,789,619
Horizontal Type	2,866	11,740,117	2,853	11,999,984
Universal Tool Milling Machine ..	116	665,547	115	699,833
Profile Milling Machine	140	2,871,353	143	3,254,339
Planomiller	60	3,457,842	61	3,447,994
Other Milling Machines	783	2,647,561	790	2,881,778

Appendix 8 (cont'd)

(Weight in ton, Value in US $)

Item of Machinery	Production		Shipment	
	Unit	Value	Unit	Value
Planers	172	3,533,772	228	5,195,975
Grinding Machines	9,350	54,750,590	9,590	55,377,614
Cylindrical Grinding Machine	1,490	11,194,258	1,491	11,319,217
Universal Grinding Machine	451	3,898,256	500	3,975,544
Roll Grinding Machine	34	3,686,106	36	3,828,225
Internal Grinding Machine	221	2,782,033	227	2,892,381
Surface Grinding Machine	2,110	11,690,653	2,212	12,532,814
Centreless Grinding Machine	1,001	7,606,411	996	7,598,633
Tool and Cutter Grinding Machine	2,598	3,926,131	2,614	3,714,244
Other Grinding Machines	1,445	9,966,742	1,514	9,516,556
Gear Cutting and Finishing Machines	1,371	11,094,125	1,442	11,750,153
Gear Hobbing Machine	867	6,882,789	907	7,364,106
Gear Shaping Machine	193	1,749,861	217	1,830,906
Other Gear Cutting Machines	117	938,347	115	974,958
Gear Grinding Machine	17	122,020	18	143,686
Gear Shaving Machine	52	825,900	54	846,733
Other Gear Finishing Machines	125	575,208	131	589,764
Special Machine Tools	2,620	30,487,772	2,678	32,632,450
Single Purpose Machine	1,661	15,508,808	1,702	17,146,050
For Drilling	343	5,082,669	368	6,229,441
For Boring	106	2,347,686	117	2,697,131
For Milling	324	2,189,917	347	2,282,500
For Others	888	5,888,536	870	5,936,978
Combined Machine	959	14,978,964	967	15,486,400
Other Machine Tools	23,691	30,559,341	23,839	30,974,616
Broaching Machine	162	2,361,439	180	2,558,125
Shaping Machine	937	2,223,247	954	2,295,150
Honing & Lapping Machine	865	2,176,344	786	2,148,958
Sawing Machine	4,467	4,929,603	4,452	5,000,955
Threading & Tapping Machine	14,107	7,284,814	14,227	7,221,650
Electrolytic, Supersonic & Electric Discharge Machine	426	3,861,647	469	3,951,925
Other Machine Tools	2,727	7,722,247	2,771	7,799,853

Source: Ministry of International Trade and Industry.

Appendix -9

Number of Machine Tool Manufacturers Classified by Types of Machine

Type of Machine Tool	Number of Machine Tool Manufacturers						
	1946-1958	1960	1961	1962	1963	1964	1965
Numbers of Members Surveyed	52	66	92	107	107	102	105
Lathes							
Engine Lathe	22	26	28	30	31	29	49
Copying Lathe	-	-	5	4	5	6	6
Turret Lathe	4	11	10	8	8	9	7
Automatic Lathe	9	16	13	12	15	20	21
Vertical Boring and Turning Mill	7	9	7	5	7	7	4
Drilling Machines							
Upright drilling machine	7	7	6	7	8	7	7
Radial Drilling Machine	10	11	12	11	13	14	13
Multi-spindle drilling machine	7	10	13	8	7	9	10
Bench Drilling Machine	6	4	6	8	10	9	10
Boring Machines							
Horizontal Boring Machine	10	9	9	10	13	15	19
Fine Boring Machine	-	10	6	8	9	9	10
Jig Boring Machine	3	4	2	2	2	3	2
Milling Machines							
Bed-type Milling Machine	7	10	8	3	8	8	10
Knee-type Milling Machine	12	16	10	15	15	13	27
Universal Tool Milling Machine	2	4	1	3	2	4	5
Profile Milling Machine	5	7	-	4	5	3	6
Plano Miller	2	7	4	4	4	7	8
Planing Machine	8	7	9	13	13	12	9

Appendix 9 (cont'd)

Type of Machine Tool	Number of Machine Tool Manufacturers 1946-1958	1960	1961	1962	1963	1964	1965
Grinding Machines							
Cylindrical Grinder	11	12	10	13	14	10	5
Internal Grinder	3	9	4	6	9	7	8
Surface Grinder	8	11	8	7	12	13	13
Centreless Grinder	5	5	6	6	5	4	6
Profile Grinder	-	-	-	2	1	1	1
Tool Grinder	-	15	16	19	19	21	20
Gear Cutting & Gear Finishing Machine							
Gear Hobbing Machine	5	11	8	9	10	10	10
Gear Shaper	1	3	4	5	4	4	4
Other Gear Cutting Machine	1	4	-	3	3	3	8
Gear Grinder	-	5	1	1	1	1	-
Gear Shaving Machine	2	8	3	7	7	4	4
Broaching Machine	2	2	3	2	2	2	3
Shaper	6	10	8	4	7	5	4
Honing Machine, Lapping Machine	4	9	9	10	8	8	9
Metal Sawing Machine	5	5	3	5	4	3	4

Source: Japan Machine Rools, Westec, '68, p.3

Appendix - 10

Enterprise Scale of Machine Tool Manufacturers (As of end of 1966)

Classification by capital (Million yen U.S.$ 2,780)		Less Than 10	10-50	50-100	100-500	500-1000	1000-2000	2000-3000	3000-5000	Over 5000	TOTAL
No. of firms	..	11	24	10	28	4	8	7	4	5	101
Amount produced during 1966 (US $ 1,000)	..	7,039	16,539	8,453	45,986	9,336	27,422	47,783	15,233	19,628	19,409
Ratio to national Production (%)	..	3	8	4	22	4	13	23	7	9	93
Amount produced per firm (US $ 1,000)	..	639	689	844	1,642	2,333	3,428	6,825	3,808	3,925	1,956
Degree of Specialization	..	85	69	64	52	24	36	33	10	0.7	6
No. of employees engaged in production, end of 1966	..	1,011	2,558	1,650	6,606	1,673	3,872	5,662	1,704	2,499	27,235
No. of employees per firm	..	92	107	165	236	418	484	809	426	500	270

Note: According to survey by Japan Machine Tool Builders Association. Figures for above table compiled from the 101 member firms of Japan Machine Tool Builders' Association, 1966 (Jan. - Dec.)

Japan Machine Tool Imports by Type of Machines and by Origin (1967)

Bloc Type	Europe Value in US $ (Mill.)	 Column %	 Row %	Communist Value in US $ (Mill.)	 Column %	 Row %	North America Value in US $ (Mill.)	 Column %	 Row %	Total Value in US $ (Mill.)	 Column %
Total	20.5	100	56	1.8	100	5	13.9	100	39	35.5	100
Engine Lathes ..	0.1	1	29	0.3	16	58	0.1	-	13	0.5	1
Copying Lathes ..	0.1	-	100	-	-	-	-	-	-	0.1	-
Automatic Lathes ..	0.7	4	69	-	-	-	0.3	2	31	1.0	3
Vertical Boring & turning ..	-	-	-	0.04	2	100	-	-	-	0.04	-
Other Lathes ..	2.0	10	59	0.1	8	4	1.3	9	37	3.4	10
Drilling Machines ..	0.1	1	18	0.1	6	22	0.3	2	60	0.5	1
Horizontal Boring M/c	0.3	2	55	0.2	12	33	0.1	1	12	0.6	2
Jig Boring Maching ..	0.8	4	80	0.02	1	2	0.2	1	18	1.0	3
Boring Machines (others)	0.5	2	99	-	-	-	0.01	-	1	0.51	1
Milling Machines ..	0.6	3	55	0.3	16	23	0.3	2	22	1.1	3
Milling Machines (others)	0.8	4	79	0.1	4	5	0.2	1	16	1.0	3
Planers ..	0.4	2	95	0.02	1	5	-	-	-	0.42	1
Internal Grinders ..	0.3	2	17	0.02	1	2	1.5	11	81	1.82	5
Surface Grinders ..	1.0	5	77	-	-	-	0.3	2	23	1.3	4
Thread Grinders ..	0.2	1	94	0.02	1	6	-	-	-	0.22	1
Cylindrical Grinders	0.2	1	82	-	-	-	0.1	-	18	0.3	1
Grinders others ..	3.6	18	66	0.1	4	1	1.8	13	33	5.5	15
Gear Hobbing Machines	0.3	1	92	0.02	1	9	-	-	-	0.32	1
Gear cutting machines	1.9	9	30	0.1	4	2	4.3	31	68	6.3	18
Super cutting machines	1.1	6	75	0.4	21	25	-	-	-	1.5	4
Gear finishing m/c ..	0.5	3	17	-	-	-	2.4	17	83	2.9	8
Broaching machines ..	0.4	2	85	-	-	-	0.1	-	15	0.5	1
Honing Machines ..	0.2	1	-	-	-	-	-	-	-	0.2	-
Metal machine Tools..	3.7	18	78	0.1	5	1	1.0	7	21	4.8	13

Machine Tools Imports (Actual Customs Cleared) By Country and By Type - 1967

(Value in million US $)

Type of Machines	Total Nos.	Total Value	England Nos.	England Value	America Nos.	America Value	Germany Nos.	Germany Value	Italy Nos.	Italy Value	Switzerland Nos.	Switzerland Value	Norway Nos.	Norway Value	Denmark Nos.	Denmark Value
Engine Lathes (SWING over 1000 mm) ..	3	55	-	-	1	.4	-	-	-	-	-	-	-	-	-	-
Engine Lathes (Swing less than 1000 mm) ..	225	166	9	10	24	17	8	23	-	-	20	7	-	-	-	-
Autocycle copying lathes (Swing less than 600 mm	7	45	-	-	-	-	2	10	-	-	4	30	-	-	-	-
Single Spindle Automatic Lathes ..	83	172	1	2	1	.6	70	128	-	-	10	39	-	-	-	-
Vertical boring & turning mills (Table dia over 2000 mm) ..	1	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Multi Spindle Automatic Lathes ..	10	207	-	-	4	115	3	33	-	-	-	-	-	-	-	-
Other Lathes ..	138	1234	12	108	31	455	50	338	2	3	8	17	2	.8	-	-
Drilling Machine ..	85	179	3	2	36	108	11	10	-	-	4	3	-	-	-	-
Horizontal boring machine (Boring main spindle dia less than 200 mm) ..	18	229	-	-	1	27	6	111	1	11	-	-	-	-	-	-
Jig boring machine (Vertical type) ..	26	241	-	-	-	-	1	6	-	-	24	230	-	-	-	-
Jig Others ..	2	99	-	-	1	62	-	-	-	-	1	37	-	-	-	-
Boring Machine others ..	9	167	-	-	1	2	5	122	1	9	-	-	-	-	-	-
Universal Tool Milling Machines ..	14	42	-	-	-	-	7	25	-	-	4	10	-	-	-	-
Profile Milling Machines (incl die sinker less than 2 milling spindles of whom working surface area 1 m^2) ..	4	41	-	-	2	8	-	-	-	-	2	33	-	-	-	-
Planomillers (Table width less than 2000 mm) ..	1	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Type of Machines	Country															
	Total		England		America		Germany		Italy		Switzerland		Norway		Denmark	
	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value
Profile Milling Machines (incl. die sinker, w/more than 3 milling spindles or working area over 1.5 m²) ..	7	233	-	-	2	83	1	25	-	-	3	88	-	-	-	-
Knee type Milling Machines ..	20	62	-	-	-	-	1	4	-	-	4	34	-	-	-	-
Milling M/c. others ..	165	372	3	47	9	57	23	160	8	33	8	23	-	-	-	-
Planers (Table width less than 2000 mm) ..	3	46	-	-	-	-	2	38	-	-	-	-	-	-	-	-
Planers Others ..	1	110	-	-	-	-	1	110	-	-	-	-	-	-	-	-
Internal Grinders (internal grinding up to 200 mm)	25	199	-	-	7	132	13	47	1	4	3	10	-	-	-	-
Internal Grinders Others	31	467	-	-	22	409	4	26	-	-	4	27	-	-	-	-
Surface grinders (Vert. rotally type & table type of grinding length up to 2000 mm) ..	32	182	-	-	4	44	25	136	-	-	-	-	-	-	-	-
Surface grinders (Grinding Length over 3000 mm excl rotally table type) ..	7	216	1	23	1	23	3	136	-	-	1	17	-	-	-	-
Surface grinders Others..	14	73	-	-	5	41	8	21	-	-	1	10	-	-	-	-
Thread Grinders ..	8	88	4	38	-	-	1	10	-	-	2	34	-	-	-	-
Cylindrical Grinders ..	13	103	1	5	1	17	9	72	-	-	1	2	-	-	-	-
Grinders (Others) ..	7102	196	28	43	122	637	6141	1021	2	.2	67	187	1	.3	1	4
Single Spindle gear hobbing m/c (vert type table dia. over 700 mm)	5	81					5	71								
Gear Gutting M/c (Others)	180	2257	2	20	80	1556	74	529	-	-	15	125	-	-	-	-
Spur Gear Grinders ..	25	54	-	-	-	-	1	11	-	-	16	392	-	-	-	-
Gear Finishing Machines..	94	1047	1	5	71	870	22	172	-	-	-	-	-	-	-	-
Broaching Machines ..	16	156	-	-	2	22	13	153	-	-	-	-	-	-	-	-
Honing Machine (for internal cylinder) ..	11	701	-	-	-	-	11	70	-	-	-	-	-	-	-	-
Metal Machine Tools (Others)	3666	1694	29	177	491	352	667	641	11	132	2211	349	2	.5	14	3
TOTAL ..	12051	12856	94	480	919	5044	7866	4242	26	193	2413	1708	5	2	15	7

Appendix 12 (Cont'd)

Type of Machines	Country															
	Rumania		Sweden		China		USSR		Czechoslovakia		France		Spain		Australia	
	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value
Engine Lathes (Swing over 1000 mm) ..	-	-	-	-	-	-	-	-	2	31	-	-	-	-	-	-
Engine Lathes (Swing less than 1000 mm) ..	5	3	-	-	4	2	123	60	13	18	-	-	-	-	-	-
Autocycle Copying Lathes (Swing less than 600 mm)	-	-	-	-	-	-	-	-	-	-	1	5	-	-	-	-
Single Spindle Automatic Lathes ..	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-
Vertical boring & turning mills (Table dia. over 2000 mm) ..	-	-	-	-	-	-	1	13	-	-	-	-	-	-	-	-
Multi spindle Automatic Lathes ..	-	-	-	-	-	-	-	-	-	-	3	58	-	-	-	-
Other Lathes ..	3	5	-	-	4	5	5	12	6	30	5	89	-	-	-	-
Drilling Machines ..	4	2	-	-	-	-	10	20	9	20	1	12	-	-	-	-
Horizontal Boring Machine (boring main spindle dia less than 200 mm) ..	-	-	-	-	-	-	4	36	2	16	-	-	-	-	-	-
Jig Boring Machine (Vertical type) ..	-	-	-	-	-	-	1	7	-	-	-	-	-	-	-	-
Jig Boring M/c others ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boring machine others ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Universal Tool Milling Machines ..	-	-	-	-	-	-	2	5	1	2	-	-	-	-	-	-
Profile Milling Machines (incl. die sinker less than 2 milling spindles of whom working surface area 1 m^2) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planomillers (Table width less than 2000 mm) ..	-	-	-	-	-	-	1	36	-	-	-	-	-	-	-	-

Appendix 12 (Cont'd)

Type of Machines	Country															
	Rumania		Sweden		China		USSR		Czechoslovakia		France		Spain		Australia	
	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value
Profile Milling Machines (incl. die sinker, w/more than 3 milling spindles or working area over 1.5 m^2) ..	-	-	-	-	-	-	1	36	-	-	-	-	-	-	-	-
Knee type Milling Machines ..	3	6	-	-	-	-	10	13	1	2	-	-	-	-	-	-
Milling Machines Others..	-	-	-	-	-	-	5	10	10	13	97	24	-	-	-	-
Planers (Table width less than 2000 mm) ..	-	-	-	-	-	-	-	-	1	8	-	-	-	-	-	-
Planers (Others) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Internal Grinders (internal grinding up to 200 mm) ..	-	-	-	-	-	-	1	5	-	-	-	-	-	-	-	-
Internal Grinders (Others)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surface Grinders (Vert. Rotally type & Table type of Grinding length upto 200 mm) ..	-	-	-	-	-	-	-	-	-	-	2	.7	1	1	-	-
Surface Grinders (Grinding length over 3000 mm excl. Rotally table type) ..	-	-	1	17	-	-	-	-	-	-	-	-	-	-	-	-
Surface Grinders (others)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thread Grinders ..	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	-
Cylindrical Grinders ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grinders (Others) ..	-	-	1	7	-	-	5	10	-	-	9	2	-	-	17	2163
Single Spindle Gear hobbing Machines (Vert. Type Table Dia. over 700 mm) ..	-	-	5	22	-	-	-	-	2	9	-	-	-	-	-	-
Gear Cutting M/c (Others)	-	-	-	-	-	-	3	15	6	13	-	-	-	-	-	-
Spur Gear Grinders ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gear Finishing Machines..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Broaching Machines ..	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Honing Machine (for internal cylinder) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metal Machine Tool others	0	6	2	.8	-	-	-	15	-	-	62	3	-	-	-	-
TOTAL ..	23	20	10	46	8	7	175	297	53	164	181	196	1	1	17	2163

Appendix 12 (Cont'd)

Type of Machines	Austria Nos.	Austria Value	Holland Nos.	Holland Value	E.Germany Nos.	E.Germany Value	N.Korea Nos.	N.Korea Value	Bulgaria Nos.	Bulgaria Value	Poland Nos.	Poland Value	Hungary Nos.	Hungary Value
Engine Lathes (Swing over 1000 mm) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Engine Lathes (Swing less than 1000 mm) ..	-	-	-	-	-	-	-	-	6	7	15	18	-	-
Autocycle Copying Lathes (Swing less than 600 mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Single Spindle Automatic Lathes ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vertical Boring & Turning Mills (Table Dia. over 2000 mm) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Multi Spindle Automatic Lathes ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Lathes ..	2	15	5	6	-	-	1	.6	4	149	-	-	-	-
Drilling Machine ..	-	-	7	.7	-	-	-	-	-	-	-	-	-	-
Horizontal Boring Machine (Boring main spindle dia. less than 200 mm) ..	-	-	-	-	4	20	-	-	-	-	-	-	-	-
Jig Boring Machine (Vertical Type) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jig Boring Machine (Others)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boring Machine Others ..	2	34	-	-	-	-	-	-	-	-	-	-	-	-
Universal Tool Milling Machines ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Profile Milling Machines (incl. die sinker less than 2 milling spindles of whom working surface area 1 m²) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planomillers (Table width less than 2000 mm) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Type of Machines	Austria		Holland		E.Germany		N.Korea		Bulgaria		Poland		Hungary	
	Country													
	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value	Nos.	Value
Profile Milling Machines (incl. die sinker, w/more than 3 milling spindles or working area over 1.5 m^2) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Knee Type Milling Machines	-	-	-	-	-	-	-	-	1	2	-	-	-	-
Milling Machines (Others)	1	2	1	5	-	-	-	-	-	-	-	-	-	-
Planers (Table width less than 2000 m) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planers (Others) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Internal Grinders (internal grinding upto 200 mm)..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Internal Grinders (Others)	-	-	-	-	1	4	-	-	-	-	-	-	-	-
Surface Grinders (Vert. Rotally Type & Table type of Grinding Length up to 2000 mm) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surface Grinders (Grinding Length over 3000 mm excl. Rotally Table Type) ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thread Grinders ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cylindrical Grinders ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grinders (Others) ..	2	3	3	26	1	5	-	-	-	-	-	-	-	-
Single Spindle Gear Hobbing Machines (Vert. Type Table dia over 700 mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gear Gutting Machine (Others)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spur Gear Grinders	-	-	-	-	8	136	-	-	-	-	-	-	-	-
Gear Finishing Machines	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Broaching Machines	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Honing Machine (For internal Cylinder)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metal Machine Tools (Others)	158	8	2	3	2	2	-	-	-	-	-	-	1	1
TOTAL ..	165	57	16	41	16	168	1	.6	11	157	15	18	1	1

Appendix - 13

Japan : Imports of Machine Tools by Country of Origin and Type : 1966

Value : US $

Country Type :		Total	North Korea	Hong Kong	Sweden	Denmark	U.K.
Total	Value	21,072,028	24,117	267	104,492	12,711	594,953
	Unit	2,990	9	1	12	7	153
	Average	7,048	2,680	267	8,708	1,816	3,889
Centre Lathe (Swing over bed over 1000 mm)	Value	115,061	-	-	3,523	-	-
	Unit	12	-	-	1	-	-
	Average	9,588	-	-	3,523	-	-
Automatic Copying Lathe (Swing over bed under 600 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Single Spindle Automatic Lathe (Bar work)	Value	161,650	-	-	-	-	-
	Unit	45	-	-	-	-	-
	Average	3,592	-	-	-	-	-
Vertical Boring & Turning Mill (Table dia. over 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Multi-spindle Automatic Lathe (Except bar M/c upto 6 spindles)	Value	363,931	-	-	-	-	-
	Unit	5	-	-	-	-	-
	Average	72,786	-	-	-	-	-
Miscellaneous Lathes	Value	2,078,608	3,753	-	-	-	156,158
	Unit	162	2	-	-	-	14
	Average	12,831	1,877	-	-	-	11,154

Appendix 13 (Cont'd)

Country		Total	North Korea	Hong Kong	Sweden	Denmark	U.K.
Drilling Machines	Value	1,050,064	9,389	-	447	-	186,856
	Unit	363	4	-	2	-	8
	Average	2,893	2,347	-	224	-	23,357
Horizontal Boring M/c (dia. of boring spindle under 200 mm)	Value	328,845	-	-	-	-	-
	Unit	12	-	-	-	-	-
	Average	27,404	-	-	-	-	-
Jig Boring Machines (Vertical type)	Value	391,450	-	-	-	-	-
	Unit	10	-	-	-	-	-
	Average	39,145	-	-	-	-	-
Jig Boring Machine (Other types)	Value	67,797	-	-	-	-	-
	Unit	1	-	-	-	-	-
	Average	67,797	-	-	-	-	-
Miscellaneous Boring Machines	Value	349,119	-	-	-	-	2,222
	Unit	7	-	-	-	-	2
	Average	49,874	-	-	-	-	1,111
Universal Tool Milling Machine	Value	81,839	-	-	-	-	-
	Unit	11	-	-	-	-	-
	Average	7,440	-	-	-	-	-
Profile Milling Machine(1)	Value	63,575	-	-	-	-	-
	Unit	3	-	-	-	-	-
	Average	21,197	-	-	-	-	-
Planomiller (Table width under 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-

Country		Total	North Korea	Hong Kong	Sweden	Denmark	U.K.
Profile Milling Machine(2)	Value	1,084,453	-	-	-	-	-
	Unit	7	-	-	-	-	-
	Average	154,922	-	-	-	-	-
Miscellaneous Milling Machines	Value	2,815,992	10,975	-	-	-	4,247
	Unit	142	3	-	-	-	1
	Average	19,831	3,658	-	-	-	4,247
Planer (Table width under 2000 mm)	Value	62,111	-	-	-	-	-
	Unit	2	-	-	-	-	-
	Average	31,056	-	-	-	-	-
Planer (Table width over 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Internal Grinder(3)	Value	487,908	-	-	-	-	31,944
	Unit	16	-	-	-	-	2
	Average	30,494	-	-	-	-	15,972
Surface Grinder (4)	Value	104,494	-	-	-	-	-
	Unit	10	-	-	-	-	-
	Average	10,449	-	-	-	-	-
Surface Grinder (5)	Value	35,331	-	-	-	-	-
	Unit	1	-	-	-	-	-
	Average	35,331	-	-	-	-	-
Thread Grinder	Value	431,642	-	-	-	-	63,906
	Unit	11	-	-	-	-	3
	Average	39,240	-	-	-	-	21,302

Country		Total	North Korea	Hong Kong	Sweden	Denmark	U.K.
Miscellaneous Grinders	Value	3,095,611	-	-	97,561	10,411	62,447
	Unit	518	-	-	7	2	11
	Average	5,976	-	-	13,937	5,206	5,677
Single Spindle Gear Hobbing Machine (6)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Gear Shaper (7)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Other Gear Cutting Machines	Value	3,211,542	-	-	-	-	9,342
	Unit	85	-	-	-	-	1
	Average	64,078	-	-	-	-	9,342
Spur Gear Grinder	Value	448,544	-	-	-	-	19,356
	Unit	7	-	-	-	-	1
	Average	64,078	-	-	-	-	19,356
Other Gear Finishing Machines	Value	1,430,881	-	-	-	-	-
	Unit	46	-	-	-	-	-
	Average	31,106	-	-	-	-	-
Broaching Machine (Pulling capacity under 30 tons)	Value	67,356	-	267	-	-	-
	Unit	20	-	1	-	-	-
	Average	3,368	-	267	-	-	-
Honing Machine (for honing of cylinder interior)	Value	39,867	-	-	-	-	-
	Unit	3	-	-	-	-	-
	Average	13,289	-	-	-	-	-
Miscellaneous Machines	Value	2,704,358	-	-	2,961	2,300	57,475
	Unit	1,491	-	-	2	5	110
	Average	1,814	-	-	1,481	460	532

Appendix 13 (Cont'd)

Country		Nether-lands	Belgium	France	W.Germany	E.Germany	Switzer-land
Type :							
Total	Value	39,558	451,042	81,650	6,346,333	135,564	2,744,711
	Unit	3	6	190	525	9	394
	Average	13,186	75,174	430	12,088	15,063	6,966
Centre Lathes (Swing over bed over 1000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Automatic Copying Lathe (Swing over bed under 600 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Single Spindle Automatic Lathe (Bar work)	Value	-	-	-	136,833	-	24,817
	Unit	-	-	-	42	-	3
	Average	-	-	-	3,258	-	8,272
Vertical Boring & Turning Mill (Table dia. over 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Multi-spindle Automatic Lathe (Except bar M/c upto 6 spindles)	Value	-	-	-	138,736	-	-
	Unit	-	-	-	2	-	-
	Average	-	-	-	69,368	-	-
Miscellaneous Lathes	Value	-	338,142	5,539	438,278	-	64,792
	Unit	-	5	1	38	-	9
	Average	-	67,628	5,539	11,534	-	7,199
Drilling Machine	Value	1,222	-	-	143,753	-	111,728
	Unit	1	-	-	10	-	248
	Average	1,222	-	-	14,375	-	451

Appendix 13 (Cont'd)

Country		Netherlands	Belgium	France	W.Germany	E.Germany	Switzerland
Horizontal Boring M/c (dia. of boring spindle under 200 mm)	Value	-	-	-	175,939	44,914	-
	Unit	-	-	-	4	5	-
	Average	-	-	-	43,985	8,983	-
Jig Boring Machine (vertical type)	Value	-	-	-	-	-	391,294
	Unit	-	-	-	-	-	9
	Average	-	-	-	-	-	43,477
Jig Boring Machine (other types)	Value	-	-	-	11,750	-	67,794
	Unit	-	-	-	1	-	1
	Average	-	-	-	11,750	-	67,794
Miscellaneous Boring Machines	Value	-	-	-	11,750	-	-
	Unit	-	-	-	1	-	-
	Average	-	-	-	11,750	-	-
Universal Tool Milling Machine	Value	-	-	-	39,353	-	23,111
	Unit	-	-	-	4	-	4
	Average	-	-	-	9,838	-	5,778
Profile Milling Machine(1)	Value	-	-	-	42,697	-	-
	Unit	-	-	-	1	-	-
	Average	-	-	-	42,697	-	-
Planomiller (Table width under 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Profile Milling Machine (2)	Value	-	-	-	948,147	-	136,306
	Unit	-	-	-	5	-	2
	Average	-	-	-	189,629	-	68,153

Country		Nether-lands	Belgium	France	W.Germany	E.Germany	Switzer-land
Miscellaneous Milling Machines	Value	-	-	57,458	1,085,183	-	98,942
	Unit	-	-	68	28	-	11
	Average	-	-	845	38,757	-	8,995
Planer (Table width under 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Planer (Table width over 2000 mm)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Internal Grinder (3)	Value	-	-	-	48,600	-	-
	Unit	-	-	-	4	-	-
	Average	-	-	-	12,150	-	-
Surface Grinder (4)	Value	-	-	-	57,269	-	-
	Unit	-	-	-	6	-	-
	Average	-	-	-	9,545	-	-
Surface Grinder (5)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Thread Grinder	Value	-	-	-	88,200	-	82,897
	Unit	-	-	-	2	-	2
	Average	-	-	-	44,100	-	41,449
Miscellaneous Grinders	Value	38,336	-	353	1,167,572	11,236	495,011
	Unit	2	-	3	117	1	55
	Average	19,168	-	118	9,979	11,236	9,000

Country		Netherlands	Belgium	France	W.Germany	E.Germany	Switzerland
Single Spindle Gear Hobbing Machine (6)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Gear Shaper (7)	Value	-	-	-	-	-	-
	Unit	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Other Gear Cutting Machines	Value	-	-	-	491,581	-	214,047
	Unit	-	-	-	25	-	8
	Average	-	-	-	19,663	-	26,756
Spur Gear Grinder	Value	-	-	-	-	76,789	352,400
	Unit	-	-	-	-	2	4
	Average	-	-	-	-	38,395	88,100
Other Gear Finishing Machines	Value	-	-	-	57,078	-	265,214
	Unit	-	-	-	3	-	5
	Average	-	-	-	19,026	-	53,043
Broaching Machine (Pulling Capacity under 30 tons)	Value	-	-	-	59,439	2,625	-
	Unit	-	-	-	1	1	-
	Average	-	-	-	59,439	2,625	-
Honing Machine (for honing of cylinder interior)	Value	-	-	-	36,169	-	-
	Unit	-	-	-	1	-	-
	Average	-	-	-	36,169	-	-
Miscellaneous Machine Tools	Value	-	112,900	18,300	1,179,756	-	416,356
	Unit	-	1	118	231	-	33
	Average	-	112,900	155	5,107	-	12,617

Country		Italy	USSR	Austria	Czechoslovakia	Hungary	Bulgaria	USA	Others
Total	Value	203,217	129,050	3,000	387,280	28,308	42,014	9,490,450	253,311
	Unit	25	39	10	29	4	23	1,393	158
	Average	8,129	3,309	300	13,355	7,077	1,827	6,813	1,603
Centre Lathe (Swing over bed over 1000 mm)	Value	-	-	-	91,833	-	-	13,850	5,855
	Unit	-	-	-	2	-	-	7	2
	Average	-	-	-	45,917	-	-	1,979	2,928
Automatic Copying Lathe (Swing over bed under 600 mm)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Single Spindle Automatic Lathe (Bar work)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Vertical Boring & Turning Mill (Table dia. over 2000 mm)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Multi-spindle Automatic Lathe (Except bar M/c upto 6 spindles)	Value	-	-	-	-	-	-	225,194	-
	Unit	-	-	-	-	-	-	3	-
	Average	-	-	-	-	-	-	75,065	-
Miscellaneous Lathes	Value	-	62,125	-	24,980	-	42,014	823,417	119,417
	Unit	-	9	-	8	-	23	10	43
	Average	-	6,902	-	3,123	-	1,827	82,342	2,777

Country		Italy	USSR	Austria	Czechoslovakia	Hungary	Bulgaria	USA	Others
Drilling Machines	Value	-	25,406	-	44,442	-	-	440,411	86,411
	Unit	-	12	-	8	-	-	58	12
	Average	-	2,117	-	5,555	-	-	7,593	7,201
Horizontal Boring M/c (dia.of boring spindle under 200 mm)	Value	-	-	-	27,378	-	-	80,614	-
	Unit	-	-	-	1	-	-	2	-
	Average	-	-	-	27,378	-	-	40,307	-
Jig Boring Machine (vertical type)	Value	-	-	-	-	-	-	155	-
	Unit	-	-	-	-	-	-	1	-
	Average	-	-	-	-	-	-	155	-
Jig Boring Machine (other types)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Miscellaneous Boring Machines	Value	-	-	-	120,000	-	-	255,147	-
	Unit	-	-	-	1	-	-	3	-
	Average	-	-	-	120,000	-	-	85,049	-
Universal Tool Milling Machine	Value	-	-	-	19,375	-	-	-	-
	Unit	-	-	-	3	-	-	-	-
	Average	-	-	-	6,458	-	-	-	-
Profile Milling Machine (1)	Value	-	-	-	-	-	-	20,878	-
	Unit	-	-	-	-	-	-	2	-
	Average	-	-	-	-	-	-	10,439	-
Planomiller (Table width under 2000 mm)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-

Appendix 13 (Cont'd)

Country		Italy	USSR	Austria	Czechoslovakia	Hungary	Bulgaria	USA	Others
Profile Milling Machine (2)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Miscellaneous Milling Machines	Value	-	16,900	-	59,272	28,308	-	1,427,656	27,050
	Unit	-	4	-	6	4	-	12	5
	Average	-	4,225	-	9,879	7,077	-	118,971	5,410
Planer (Table width under 2000 mm)	Value	-	-	-	-	-	-	62,111	-
	Unit	-	-	-	-	-	-	2	-
	Average	-	-	-	-	-	-	31,056	-
Internal Grinder (3)	Value	-	-	-	-	-	-	407,364	-
	Unit	-	-	-	-	-	-	10	-
	Average	-	-	-	-	-	-	40,736	-
Surface Grinder (4)	Value	11,692	3,419	-	-	-	-	32,114	-
	Unit	2	1	-	-	-	-	1	-
	Average	5,846	3,419	-	-	-	-	32,114	-
Surface Grinder (5)	Value	-	-	-	-	-	-	35,331	-
	Unit	-	-	-	-	-	-	1	-
	Average	-	-	-	-	-	-	35,331	-
Thread Grinder	Value	-	-	-	-	-	-	196,639	-
	Unit	-	-	-	-	-	-	4	-
	Average	-	-	-	-	-	-	49,160	-

Country		Italy	USSR	Austria	Czechoslovakia	Hungary	Bulgaria	USA	Others
Miscellaneous Grinders	Value	38,675	15,500	3,000	-	-	-	1,151,406	4,103
	Unit	7	10	10	-	-	-	290	3
	Average	5,525	1,550	300	-	-	-	3,970	1,368
Single Spindle Gear Hobbing Machine (6)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Gear Shaper (7)	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Other Gear Cutting Machines	Value	-	-	-	-	-	-	2,496,572	-
	Unit	-	-	-	-	-	-	51	-
	Average	-	-	-	-	-	-	48,952	-
Spur Gear Grinder	Value	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Other Gear Finishing Machines	Value	6,525	-	-	-	-	-	1,102,064	-
	Unit	1	-	-	-	-	-	37	-
	Average	6,525	-	-	-	-	-	29,786	-
Broaching Machine (Pulling Capacity under 30 tons)	Value	-	-	-	-	-	-	5,025	-
	Unit	-	-	-	-	-	-	17	-
	Average	-	-	-	-	-	-	296	-

Country		Italy	USSR	Austria	Czechoslovakia	Hungary	Bulgaria	USA	Others
Honing Machine (For honing of cylinder interior)	Value	-	-	-	-	-	-	3,697	-
	Unit	-	-	-	-	-	-	2	-
	Average	-	-	-	-	-	-	1,849	-
Miscellaneous Machine Tools	Value	146,325	5,700	-	-	-	-	750,805	10,481
	Unit	15	3	-	-	-	-	880	93
	Average	9,755	1,900	-	-	-	-	853	113

Note : (1) Profile Milling Machine : Milling spindle below 2 and milling area 1 m^2, profiling by other than manual or cam mechanism.

(2) Profile Milling Machine : Over 3 milling spindles: over 1.5 m^2 milling area, profiling by other than cam mechanism.

(3) Internal Grinder : Internal grinding dia. below 200 mm; Except centerless grinders.

(4) Surface Grinder : Vertical type with rotary table; Reciprocating table type with grinding length below 2000 mm.

(5) Surface Grinder : Grinding length over 3000 mm; Except rotary table type.

(6) Single Spindle Gear Hobbing Machine : Vertical type with table dia. over 700 mm.

(7) Gear Shaper : Pinion cutter type, over 600 mm dia. and Rack Cutter type, over 1200 mm dia.

Source :

Appendix - 14

Sectorwise Analysis of Machine Tool Imports into Japan - 1955-66

(Value in Million Yen)

	General Machines			Elec. Mach. & Equip. supplies			Transport Equipments			Precision instruments			Aircraft			Ordnance			Total		
	Value	%	Index	Value	%	Index	Value	%	Index	Value	%	Index	Value	%	Index	Value	%	Index	Value	%	Index
1955	33700	67.8	100	5992	12.1	100	5212	10.5	100	3372	6.8	100	1420	3.0	100	63	-	100	49759	100	100
1960	102385	69.5	302	12331	8.3	204	4880	3.3	93	11507	7.8	345	15790	10.8	1120	334	-	528	147226	100	302
1961	166366	74.9	491	14892	6.7	255	6121	2.7	116	16346	7.2	489	17839	8.1	1246	285	0.2	448	221849	100	442
1962	207366	73.5	613	28708	10.3	493	7313	2.5	139	14760	5.3	444	23362	8.1	1631	135	-	208	281664	100	562
1963	208241	70.3	616	38335	12.8	646	10219	3.4	193	18797	6.4	564	19608	6.8	1372	346	-	560	295547	100	603
1964	200291	67.8	592	42834	14.5	731	11671	4.0	220	18825	6.4	564	21238	7.1	1484	250	-	400	295083	100	603
1965	164607	62.9	488	39951	15.2	680	12888	4.9	245	15520	5.7	465	29242	11.0	2044	620	0.3	992	262429	100	523
1966	168935	60.3	500	44298	15.7	751	17107	6.0	325	18009	6.4	540	80688	28.9	5064	801	0.3	1280	299754	100	563

Note: For Index 1955 = 100 is base

Source: Ministry of International Trade and Industry.

Appendix - 15

Tariff on Japan Import of Machine Tools

Description	Rate of Duty	
	General	GATT
Tools for working in the hand with self-contained electric motor	15%	
Grinders		15%
Drills		15%
Other tools		15%
Parts		
Parts of hydraulic presses for working wood, cork hard artificial plastic and similar hard carving materials		15%
Parts of hydraulic presses for working stone, ceramic, asbestos-cement and like minerals, n.e.s.		15%
Parts and accessories of machine-tools for working metal or metal carbides n.e.s.		
Parts and accessories of machine tools for working stone, ceramic, asbestos-cement and like mineral materials n.e.s.		
Parts and accessories of machine-tools for working glass in the cold n.e.s.		
Parts and accessories of machine tools for working wood, n.e.s.		
Parts and accessories of machine tools for working cork, hard artificial plastic materials or other hard carving materials n.e.s.		
Tools for working in the hand, pneumatic or with self-contained non-electric motor:		
1. Pneumatic tools and parts thereof	15%	
Pneumatic rock drills		
Pneumatic tools n.e.s.		15%
Parts		15%

Description	Rate of Duty	
	General	GATT
2. Others	15%	
Tools for working in the hand Parts		
Gas-operated welding, brazing, cutting and surface tampering appliances	15%	
Machine-tools for working metal or metallic carbides, not being machines falling within heading No. 84.49 or 84-50		
1. Machine-tools whose function is to remove metal or metallic carbides:		
(1) Lathes:		
A Engine lathes, with a swing over bed not less than 1,000 mm	25%	25%
B Automatic copying lathes, with a swing over bedless than 600 mm	25%	25%
C Automatic lathes, single spindle, of bar type	25%	25%
D Vertical lathes, with a table not less than 2,000 mm in diameter	25%	25%
E Other	15%	
Engine lathes, with a swing over bed less than 1,000 mm		15%
Automatic lathes, multi-spindles, excluding those of bar type with not more than 6 spindles		10%
Other		15%
(2) Drilling machines and boring machines		
A Horizontal boring machines with a main boring spindle less than 200 mm in diameter	25%	25%

Description	Rates of Duty		
	General	GATT	Temporary
Designed to perform machine table positioning by means of oscillating motion mechanism			15% (43.3.31) (8/31/68)
B. Vertical jig boring machines	25%		
With a horizontal boring spindle not less than 100 mm in diameter		1	15% (43.3.31) (8/31/68)
Other			
C. Other	15%		
Drilling machines Jig boring machines Boring machines, n.e.s.		15%	
(3) Milling machines:			
A. Universal tool milling machines	15%	25%	
B. Profile milling machines (including diesinking machines), equipped with one or two milling spindles, of a working surface less than 1 m^2 excluding hand operated type machines and cam type machines	25%	25%	
C. Plane-millers, with a table not more than 2,000 mm in width	25%	25%	
D. Other	15%		
Profile milling machines (including diesinking machines, but not including cam type machines), equipped with not less than 3 milling spindles, or of a working suraface not less than 1.3 m^2		10%	

Description	Rate of Duty		
	General	GATT	Temporary
Milling machines, knee type		15%	
Other		15%	
(4) **Planers:**			
A Planers, with a table not more than 2,000 mm in width	25%		
B Other	15%		
(5) Grinding machines:			
A Internal grinding machines with the minimum working diameter less than 200 mm, excluding centerless type	25%	25%	
Designed to automatically perform simultaneous grinding of internal surface as well as the edge or the bottom plane vertical to hole-centerline, of a work piece, with 2 grinding spindles			15% (43.3.31) (3/31/68)
Designed to automatically perform simulteneous grinding of internal surface of the both edge of a work piece, with 2 grinding spindles			15% (43.3.31) (3/31/68)
Other			
B Surface grinding machines rectangular table type, with the maximum grinding length less than 2,000 mm, and vertical surface grinding machines, rotary table type	25%	25%	
C Other	15%		

Description	Rate of Duty General	 GATT	 Temporary
Internal grinding machines surface grinding machines, with the maximum grinding length more than 3,000 mm, excluding		10%	
Surface grinding machines, n.e.s.		15%	
Thread grinding machines		10%	
Cylindrical grinding machines		15%	
(6) Gear cutting machines and gear finishing machines:			
A Vertical hobbing machines, single spindle with a table not less than 700 mm in diameter	25%	25%	
B Other	15%		
Spur gear shapers, pinion gear cutter type, with the maximum working diameter not less than 900 mm, and rack cutter type, with the maximum working diameter not less than 1,200 mm		10%	
Other gear cutting machines		15%	
Spur gear grinding machines		10%	
Gear finishing machines, n.e.s.			
(7) Other			
A Broaching machines, with a broaching capacity less than 30 weighing tons	25%		
Designed to perform continuous broaching of a work pieces which are continuously fed, in with a broaching capacity more than 10 weighing tons			15% (43.3.31) (3/31/68)

Description	Rate of Duty		
	General	GATT	Temporary
Other			
B Honing machines for bore	25%		
C Other	15%		
2 Other:			
(1) Bending machines	15%	15%	
(2) Presses	15%		
Hydraulic presses Mechanical presses Presses, n.e.s.		15%	
(3) Shearing machines	15%		
For metal plate or sheet		15%	
Other		15%	
(4) Forging machines (including forging rolls)	15%		
Power hammers Other			
(5) Other	15%		
Wire-drawing machines Drawing machines, excluding wire-drawing machines Other			
Machine tools for working stone ceramics, concrete, asbestos-cement and like mineral materials or for working glass, in the cold, other than machines falling within heading No.84-49	15%		
Machine tools for working stone, ceramics, asbestos-cement and like mineral materials			
Machine-tools for working glass in the cold			

Description	Rate of Duty		
	General	GATT	Temporary
Machine tools for working wood, cork, bone, ebonite (vulcanite), hard artificial plastic materials or other hard carving materials, other than machines falling within heading No. 84.49	15%		
Hydraulic presses		15%	
Wire-bound box making machines		15%	
Wood working machines whose function is to remove wood or bark		15%	
Wood working machines, n.e.s.		15%	
Other			
Accessories and parts suitable for use solely or principally with the machines falling within headings Nos. 84.45 to 84.47, including work and tool holders, self-opening dieheads, dividing heads and other appliances for machine-tools; tool holders for any type of tool or machine tool for working in the hand	15%		
Tool holders			
Rolls, of iron or steel more than 1,000 kg in weight		15%	

Appendix - 16

List with Addresses of Machine Tools Importers in Japan

1. Dainichi Kinzoku Kogyo Co Ltd
1-21, Jokoji-Nishinomachi
Amagasaki, Hyogo Pref.
Tel: Osaka (401) 3601-6.

2. Enshu Ltd
New Yaesu Bldg
3, Nihonbashi-Dori, Chou-ku
Tokyo, Tel:(271) 4101

3. Fuji Machine Mfg Co Ltd
108, Aoyama Mitamachi, Akasaka
Minato-ku, Tokyo
Tel (402)8437-9.

4. Fuji Seizakusho Ltd
Marunouchi Bldg
Marunouchi, Chiyoda-ku
Tokyo, Tel (201) 3337-9

5. Hamai Co Ltd
5-5-15, Nishi-Gotanda
Shinagawa-ku, Tokyo
Tel (491) 5585,6905,6960,6560

6. Hitachi Ltd
Nihon Bldg, 2-8 Ohtemachi
Chiyoda-ku, Tokyo
Tel (270) 2111

7. Hitachi Seiki Co Ltd
Export Div. Hakko Co Ltd
Marunouchi Bldg, Marunouchi
Chiyoda-ku, Tokyo Tel (212)7931

8. Howa Sagyo Co Ltd
1111, Maene, Konan, Aichi Pref.
Tel (5) 1151

9. Ikegai Iron Works Ltd
1-21, 4-Chome, Shibe, Minato-ku
Tokyo, Tel (452)8111

10. Kashifugi Works Ltd
28, Kamota, Kamitoba, Minami-ku
Kyoto, Tel: (69) 9171.

11. Makino Milling Machine Co Ltd
2-3-19, Nakane-cho, Meguro-ku
Tokyo.
Tel: (212) 3111

12. Mitsui Seiki Kogyo Co Ltd
3-3-7 Nihombashi Muromachi
Chou-ku, Tokyo
Tel (270) 0311

13. Mitubishi Heavy Industries Ltd
2-10, Maruncuchi, Chiyoda-ku
Tokyo, Tel (212) 3111

14. Miyano Machinery Co Ltd
3-2, Kanada Jinbo-cho
Chiyoda-ku
Tokyo, Tel (265) 6611

15. Murata Machinery
103, Kishoin, Ochiaicho
Minami-ku
Kyoto, Tel (68) 9141

16. Nigata Engineering Co Ltd
Kangin Okachimachi Bldg
2-27-7, Daito, Daito-ku
Tokyo. Tel (833) 3211

17. Nippei Industrial Co Ltd
Kobikikan Bekkan, 6-1, Ginza-Higashi, Chou-ku, Tokyo

18. Okamoto Machine Tool Works Ltd
1000, Minowa-cho , Kohoku-ku
Yokohama City Tel: Hiyoshi
(0446)-2741-5

19. Okuma Machinery Works Ltd
Dai-Nagoya Bldg
3-88, Hiroi-cho
Nakamura-ku, Nagoya
Tel: (561) 5571-4.

20. O.M. Ltd
Nittobo Bldg
6-1, Yaesu
Chou-ku, Tokyo
Tel: (272) 1931

21. Osaka Kiko Co Ltd
1-18, Toyosaki-Nishidori
Oyodo-ku, Osaka
Tel: (371) 2135

22. Riken Steel Co Ltd
Toranomon Bldg
15, Shiba Toranomon,
Minato-ku, Tokyo
Tel (591) 2324-6

23. Sansei Manufacturing Co Ltd
2-4-5, Shibaura, Minato-ku
Tokyo, Tel: (452) 1391

24. Shin Nippon KokiCo Ltd
Tokyo Kaijo Bldg
1-6, Marunouchi
Chiyoda-ku, Tokyo
Tel (212) 2031

25. Shoun Machine Tool Co Ltd
1-2-2, Uchisaiwai-cho
Chiyoda-ku, Tokyo
Tel (591) 4421-4.

26. Takisawa Machine Tool Co Ltd
Higashi-Ginza Bldg
3-4, Ginza-Higashi, Chou-ku
Tokyo, Tel (541) 3993.

27. Toshibo Machine Co Ltd
Sukiyabashi Fuji Bldg
4-3 Ginza-Nishi
Chou-ku
Tokyo. Tel (567) 0511.

28. Tokyo Kikai Seisakusho Ltd
5-26-24, Shiba, Minato-ku
Tokyo
Tel (451)· 8141-7

29. Toyoda Machine Works Ltd
1-1, Asahi-cho
Kariya, Aichi Pref
Tel (21) 2641

30. Tsugami Manufacturing Co Ltd
Nissei Bldg
1-1-10, 4 Chome, Shinbashi
Minato-ku, Tokyo
Tel: (433) 5231

31. Yamazaki Machinery Works Ltd
1, Koguchi, Oguchi-machi
Niwa-gun, Aichi Pref
Tel: Konan 4131

32. Yasuda Industry Co Ltd
24-Takanawakita-machi
Minato-ku
Tokyo. Tel(473) 0078

33. Yutaka Seimitsu Kogyo Ltd
592, Kami Ochiai, Yono City
Saitama Pref
Tel: Urawa (0488) 31-0101

Appendix - 17

Exports of Metal Machine Tools Actually Customs Cleared by Country: 1967

(Value in Yen)

Country		Total	
		Nos.	Value
Total		36,565	17,641
Far East Asia	Ryukyu	572	63
	Korea	7,233	1,183
	Taiwan	2,491	970
	Hongkong	1,771	78
South East Asia	South Viet Nam	194	51
	Thai	5,105	220
	Singapore	429	30
	Malaya	312	48
	Phillippines	1,457	363
	Indonesia	35	14
	Cambodia	80	20
	Burma	30	20
	India	92	239
	Pakistan	220	88
	Ceylon	7	6
	Others	34	12
Middle East	Saudi Arabia	14	.1
	Kuwait	13	2
	Jordan	1	-
	Syria	134	2
	Lebanon	43	.7
	Turkey	163	22
	Others	515	27
Europe	Sweden	533	109
	England	492	306
	Holland	396	51
	Belgium	236	39
	France	273	265
	West Germany	44	26
	Switzerland	14	20
	Spain	6	25
	Italy	2	12
	Greece	44	2
	Others	231	86

Appendix 17 (cont'd)

Country		Total	
		Nos.	Value
	China	226	775
	USSR	417	2,061
	Others	16	63
	Canada	1,406	673
North America	USA	7,016	7,883
Central & South America	Mexico	95	127
	El Salvidor	39	1
	Venezuela	39	1
	Peru	14	16
	Chille	78	8
	Brazil	62	154
	Others	348	78
	United Arab States	18	2
Africa	Kenya	1	-
	South African Republic	1,854	541
	Others	250	45
Oceania	Australia	1,122	674
	New Zealand	244	28
	Others	4	4

Machine Tools Export (Actual Custom Cleared) : 1967 (Country-wise)

Type of Machines	Total Value			USA			Canada			West Germany			England			Australia		
	Nos	Value '000$	Average value US $	Nos.	Value '000$	Average value US $	Nos.	Value '000$	Average value US $	Nos.	Value '000$	Average value US $	Nos.	Value '000$	Average value US $	Nos.	Value '000$	Average value US $
Total Value	36565	48747	1333	7016	22058	3144	1506	1859	1234	44	73	1659	492	845	1717	1122	1863	1660
Engine Lathes (Centre lathes)	2571	8724	3393	1491	5165	3464	136	527	3875	11	32	2909	89	328	3685	205	584	2849
Copying Lathes	37	215	5811	7	34	4857	10	40	4000	1	4	4000	-	-	-	-	-	-
Automatic type	773	3295	4263	539	2506	4649	1	14	14000	1	3	3000	1	3	3000	11	44	4000
Vertical Boring & Turning Mills	3	41	13667	1	37	37000	-	-	-	-	-	-	-	-	-	-	-	-
Turret Lathes (Capstan Lathes)	415	2449	5901	270	1730	6407	25	182	7280	-	-	-	-	-	-	21	99	4714
Other Lathes	800	1755	2194	217	519	2392	34	91	2676	-	-	-	1	1	1000	46	72	1565
Radial Drilling M/cs	373	1419	3804	224	725	3237	16	84	5250	-	-	-	22	5	227	13	79	6077
Upright Drilling M/cs	6622	739	112	851	173	203	444	43	97	-	-	-	205	21	102	6	5	833
Multi-spindle Drilling Machine	59	305	5169	4	14	3500	1	5	5000	-	-	-	-	-	-	-	-	-
Other Drilling M/cs	6499	1267	195	1162	229	197	570	35	61	-	-	-	10	3	300	434	26	60
Horz Boring Machines	81	2334	28815	46	1222	26565	1	13	13000	-	-	-	10	124	12400	2	19	9500
Jig Borers	76	1976	26000	32	679	21219	-	-	-	-	-	-	1	30	30000	-	-	-
Other Boring M/cs	498	936	1880	14	225	16071	-	-	-	-	-	-	-	-	-	18	103	5722
Knee Type Milling M/c	840	4621	5501	655	3532	5392	43	335	7791	-	-	-	23	81	3522	21	85	4048
Other Milling M/cs	748	4996	6679	369	2557	6930	32	273	8531	1	4	4000	28	149	5321	18	72	4000
Planers	40	232	5800	4	45	11250	1	10	10000	-	-	-	-	-	-	-	-	-
Internal Grinders	248	273	1101	206	47	228	-	-	-	-	-	-	-	-	-	-	-	-
Surface Grinders	967	1892	1957	63	246	3905	5	34	6800	-	-	-	1	8	8000	16	83	5188
Cylindrical Grinders	147	1113	7571	61	447	7328	2	18	9000	-	-	-	1	11	11000	5	42	8400
Other Grinders	10565	5314	503	376	1308	3479	26	108	4154	27	2	74	34	31	912	125	214	1712
Gear Hobbing M/cs	150	1293	8620	6	63	10500	2	10	5000	-	-	-	4	19	4750	-	-	-
Other Gear Cutting & Finishing Machine	41	356	8683	1	2	2000	-	-	-	-	-	-	-	-	-	-	-	-
Metal Sawing & Cutting Machine	1955	537	275	107	132	1234	133	32	241	-	-	-	10	2	200	17	23	1353
Other Machine Tools	2057	2664	1295	310	420	1355	24	6	250	3	28	9333	52	31	596	164	312	1902

Japan: Exports of Machine Tools by Type and Bloc - 1968

Block Type		Total	Far East Asia	South East Asia	Middle East Asia	Europe	Communist Bloc	North America	Central & S.America	Africa	Oceania
Total	Value	40,584,567	4,230,144	4,236,445	146,925	3,657,316	5,553,416	18,845,650	1,540,233	944,544	1,426,894
	Unit	36,004	9,679	10,849	1,731	2,263	607	7,665	562	1,528	1,120
Centre Lathe	Value	9,611,199	499,888	656,508	-	1,071,925	327,752	6,349,444	62,436	233,555	410,691
	Unit	938	116	177		317	50	50	25	57	146
Copying Lathe	Value	371,415	22,400	19,872	-	118,347	57,722	72,236	80,838	-	-
	Unit	67	3	6		62	6	9	1		
Automatic Lathe	Value	1,968,098	315,471	109,471	-	401,638	48,508	1,023,113	23,297	17,955	28,891
	Unit	479	155	23		52	6	229	5	4	7
Vertical Lathe	Value	331,918	-	22,505	-	-	57,008	145,808	106,597	-	-
	Unit	19		9			4	3	3		
Other Lathes	Value	4,132,821	234,885	573,816	3,711	436,422	309,616	2,207,794	29,225	212,950	124,402
	Unit	1,268	263	114	8	83	46	680	11	16	47
Radia Drilling Machine	Value	1,075,908	96,087	95,391	502	53,147	29,325	706,785	53,580	15,730	25,563
	Unit	301	52	16	1	9	3	197	9	4	10
Other Drilling Machines	Value	1,498,044	249,667	415,519	78,083	112,325	54,702	284,766	235,752	25,611	41,619
	Unit	12,911	3,085	4,390	987	1,402	18	1,959	210	295	555
Horizontal Boring Machine	Value	2,673,757	220,066	189,694	-	426,402	632,019	1,056,211	29,500	44,277	95,588
	Unit	107	12	6		16	27	39	2	1	4
Jig Boring Machine	Value	1,813,367	39,069	98,463	-	161,186	1,108,719	272,050	96,880	-	57,200
	Unit	77	10	4		9	31	14	5		4
Other Boring Machines	Value	919,878	183,098	94,577	8,838	17,836	82,094	338,650	154,058	34,258	6,469
	Unit	366	143	120	19	5	8	19	39	7	6

Block Type		Total	Far East Asia	South East Asia	Middle East Asia	Europe	Communist Bloc	North America	Central & S.America	Africa	Oceania
Planomiller	Value	119,299	2,980	74,534	-	-	-	-	-	-	41,786
	Unit	3	1	1							1
Other Milling Machines	Value	7,374,548	493,499	232,213	-	508,427	726,694	4,505,177	432,766	122,172	353,600
	Unit	1,141	130	46		72	83	736	17	12	45
Planer	Value	317,154	49,475	220,894	-	22,991	-	12,161	-	-	11,633
	Unit	27	8	16				1			2
Internal Grinding Machine	Value	413,558	112,900	10,705	6,547	-	250,213	31,216	-	-	1,977
	Unit	64	27	5	1		22	4			5
Surface Grinding Machine	Value	849,607	197,007	110,069	-	35,527	226,180	243,672	17,452	5,675	14,025
	Unit	235	82	43		7	38	53	3	4	5
Other Grinding Machines	Value	3,968,398	791,163	530,013	13,619	130,261	1,195,313	953,858	54,261	113,533	186,377
	Unit	11,289	4,719	4,378	252		152	631	120	862	175
Hobbing Machine	Value	636,429	108,039	75,019	-	12,480	180,700	214,922	3,200	37,208	4,861
	Unit	101	31	18		3	24	18	1	4	2
Gear Cutting and Finishing Machine	Value	283,672	104,163	25,869	2,202	79,672	63,075	-	8,691	-	-
	Unit	92	45	5	6	5	29		2		
Metal Sawing Machine	Value	538,523	68,841	132,444	4,491	6,272	1,675	269,952	2,205	35,688	16,955
	Unit	2,151	278	1,014	26	9	1	694	6	110	13
Other Machine Tools	Value	1,717,764	441,446	549,116	31,927	62,452	202,094	177,830	130,888	76,761	45,250
	Unit	2,319	519	458	421	47	59	465	105	152	93

Source: Statistics by Ministry of Finance.

Appendix - 20

Japan : Exports of Machine Tools by Type and Country (January - December 1966)

(Value US $)

	Country	Total	South Korea	Taiwan	Hong Kong	Thailand	Philippines	Indonesia	India
Total	Value('000 $)	40,585	1,947	1,746	341	846	1,209	156	1,054
	Unit	36,004	4,066	2,357	2,378	6,910	2,077	108	159
	Average	1,127	479	741	144	123	582	1,443	6,628
Center Lathe	Value('000 $)	9,611	365	93	3	128	301	37	26
	Unit	938	70	20	2	45	32	3	2
	Average	10,247	5,221	4,656	1,463	2,842	9,397	12,231	12,881
Copying Lathe	Value('000 $)	371	-	22	-	-	16	-	4
	Unit	87	-	3	-	-	5	-	1
	Average	4,269	-	7,467	-	-	3,131	-	4,217
Automatic Lathe	Value ('000 $)	1,968	55	132	125	-	2	-	91
	Unit	479	14	70	70	-	1	-	17
	Average	4,109	3,957	1,882	1,792	-	2,050	-	5,362
Vertical Lathe	Value('000 $)	331	-	-	-	-	16	-	-
	Unit	19	-	-	-	-	1	-	-
	Average	17,469	-	-	-	-	16,000	-	-
Other Lathes	Value('000 $)	4,133	102	107	17	64	236	30	152
	Unit	1,268	126	104	25	33	22	8	27
	Average	3,259	813	1,025	680	1,940	10,721	3,709	5,621
Radial Drilling Machine	Value('000 $)	1,076	48	46	2	18	46	12	-
	Unit	301	6	44	1	6	2	3	-
	Average	3,574	8,042	1,035	1,978	3,073	22,940	3,937	-
Other Drilling Machines	Value('000 $)	1,498	127	75	33	169	97	10	67
	Unit	12,911	1,209	731	1,024	2,938	925	51	15
	Average	116	105	103	33	58	104	192	4,481
Horizontal Boring Machine	Value('000 $)	2,674	189	31	-	-	141	-	49
	Unit	107	10	2	-	-	4	-	2
	Average	24,983	18,915	15,457	-	-	35,133	-	24,581
Jig Boring Machine	Value('000 $)	1,813	7	28	5	-	8	-	91
	Unit	77	1	8	1	-	1	-	3
	Average	23,550	6,500	3,498	4,589	-	7,700	-	30,255

Appendix 20 (cont'd)

	Country	Total	South Korea	Taiwan	Hong Kong	Thailand	Philippines	Indonesia	India
Other Boring Machines	Value('000 $)	920	63	119	1	13	22	-	22
	Unit	366	7	134	1	21	54	-	14
	Average	2,513	9,028	888	505	599	407	-	1,558
Planomiller	Value('000 $)	119	-	3	-	-	-	-	75
	Unit	3	-	1	-	-	-	-	1
	Average	39,766	-	2,980	-	-	-	-	74,533
Other Milling	Value('000 $)	7,375	204	233	46	23	75	16	19
	Unit	1,141	49	49	20	7	9	4	4
	Average	6,463	4,155	4,757	2,289	3,345	8,348	3,992	4,797
Planer	Value('000 $)	317	-	46	-	27	29	12	141
	Unit	27	-	3	2	9	1	2	1
	Average	11,746	-	15,433	146	3,006	28,500	5,756	141,147
Internal Grinding Machine	Value('000 $)	414	46	66	Neg	2	Neg	-	-
	Unit	64	4	21	1	2	1	-	-
	Average	6,462	11,545	3,142	375	863	311	-	-
Surface Grinding Machine	Value('000 $)	850	125	63	8	10	22	Neg	30
	Unit	235	36	35	3	26	2	1	6
	Average	3,615	3,468	1,806	2,533	376	11,140	378	5,014
Other Grinding Machines	Value('000 $)	3,968	392	301	31	108	61	32	107
	Unit	11,289	2,406	784	998	2,939	855	32	29
	Average	352	163	384	31	37	71	1,008	3,680
Hobbing Machine	Value('000 $)	636	40	69	-	13	1	-	59
	Unit	101	15	16	-	11	1	-	5
	Average	6,301	2,635	4,282	-	1,151	850	-	11,877
Gear Cutting and Finishing Machine	Value('000 $)	284	22	78	2	-	4	-	21
	Unit	92	14	22	3	-	2	-	3
	Average	3,083	1,571	3,536	671	-	2,246	-	7,126
Metal Sawing Machine	Value('000 $)	539	15	31	10	47	40	-	4
	Unit	2,151	11	50	156	627	112	-	3
	Average	250	1,404	629	64	76	357	-	1,395
Other Machine Tools	Value('000 $)	1,718	146	203	59	224	94	8	96
	Unit	2,319	88	260	71	246	47	4	26
	Average	741	1,662	781	830	912	1,991	1,879	3,686

Country		Pakistan	Sweden	U.K.	Netherlands	France	West Germany	Switzerland	Spain
Total	Value('000 $)	418	861	893	298	687	452	21	34
	Unit	186	155	401	799	277	224	18	7
	Average	2,247	5,552	2,228	373	2,481	2,018	1,141	4,864
Center Lathe	Value('000 $)	93	102	303	140	31	294	-	4
	Unit	81	28	90	42	10	92	-	1
	Average	1,150	3,634	3,371	3,339	3,117	3,200	-	3,503
Copying Lathe	Value('000 $)	-	5	-	-	113	-	-	-
	Unit	-	1	-	-	61	-	-	-
	Average	-	4,986	-	-	1,858	-	-	-
Automatic Lathe	Value('000 $)	12	166	156	32	23	-	-	-
	Unit	2	8	25	8	7	-	-	-
	Average	5,756	20,751	6,254	4,002	3,310	-	-	-
Vertical Lathe	Value('000 $)	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Other Lathes	Value('000 $)	43	142	7	34	196	15	Neg.	15
	Unit	7	25	3	9	16	5	16	3
	Average	6,136	5,691	2,315	3,745	12,266	2,965	7	5,039
Radial Drilling Machine	Value('000 $)	-	33	-	-	-	-	-	-
	Unit	-	6	-	-	-	-	-	-
	Average	-	5,462	-	-	-	-	-	-
Other Drilling Machine	Value('000 $)	3	1	15	57	8	8	-	-
	Unit	13	9	158	730	153	88	-	-
	Average	230	81	93	78	53	86	-	-
Horizontal Boring Machine	Value('000 $)	-	122	71	16	151	-	16	-
	Unit	-	5	6	1	1	-	1	-
	Average	-	24,461	11,819	15,700	150,911	-	16,300	-
Jig Boring Machine	Value('000 $)	-	17	21	5	99	-	-	-
	Unit	-	1	2	1	4	-	-	-
	Average	-	16,997	10,702	5,100	24,704	-	-	-
Other Boring Machines	Value('000 $)	9	-	16	-	-	-	-	-
	Unit	1	-	1	-	-	-	-	-
	Average	8,691	-	16,289	-	-	-	-	-
Planomiller	Value('000 $)	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-

Appendix 20 (Cont'd)

	Country	Pakistan	Sweden	U.K.	Netherlands	France	West Germany	Switzerland	Spain	Italy
Other Milling Machines	Value ('000 $)	70	225	171	6	54	34	-	5	-
	Unit	17	25	25	1	3	14	-	1	-
	Average	4,104	8,990	6,824	5,700	17,914	2,422	-	4,644	-
Planer	Value ('000 $)	-	-	-	-	-	-	-	-	-
	Unit	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
Internal Grinding M/c.	Value ('000 $)	9	-	-	-	-	-	-	-	-
	Unit	2	-	-	-	-	-	-	-	-
	Average	4,327	-	-	-	-	-	-	-	-
Surface Grinding M/c.	Value ('000 $)	6	-	32	-	-	-	-	-	-
	Unit	1	-	6	-	-	-	-	-	-
	Average	5,561	-	5,413	-	-	-	-	-	-
Other Grinding M/c.	Value ('000 $)	129	47	36	7	8	25	4	Neg	Neg
	Unit	39	37	70	1	1	19	1	1	20
	Average	3,296	1,268	507	7,139	8,342	1,305	4,131	185	20
Hobbing Machine	Value ('000 $)	-	-	12	-	-	-	-	-	-
	Unit	-	-	3	-	-	-	-	-	-
	Average	-	-	4,160	-	-	-	-	-	-
Gear Cutting and Finishing Machine	Value ('000 $)	-	-	23	-	-	46	-	11	-
	Unit	-	-	3	-	-	1	-	1	-
	Average	-	-	7,790	-	-	45,700	-	10,603	-
Metal Sawing Machine	Value ('000 $)	1	-	4	1	-	1	-	-	-
	Unit	4	-	2	6	-	1	-	-	-
	Average	190	-	2,150	222	-	639	-	-	-
Other Machine Tools	Value ('000 $)	45	1	25	-	3	30	-	-	-
	Unit	19	10	7	-	21	4	-	-	-
	Average	2,372	118	3,546	-	162	7,558	-	-	-

Appendix 20 (cont'd)

		Italy	Communist China	U.S.S.R.	Canada	U.S.A.	Mexico	Brazil	Rep of S.Africa	Australia	Others
Total	Value ('000$)	24	4,254	1,202	2,140	16,705	833	585	818	1,393	1,668
	Unit	26	453	138	1,591	6,074	211	26	1,188	1,029	5,146
	Average	930	9,392	8,707	1,345	2,750	3,947	22,498	689	1,353	324
Center Lathe	Value ('000$)	-	257	65	727	5,622	36	-	226	406	352
	Unit	-	33	16	162	1,752	18	-	55	144	104
	Average	-	7,778	4,084	4,490	3,209	1,999	-	4,101	2,818	3,385
Copying Lathe	Value ('000$)	-	58	-	-	72	-	81	-	-	-
	Unit	-	6	-	-	9	-	1	-	-	-
	Average	-	9,629	-	-	8,026	-	80,839	-	-	-
Automatic Lathe	Value ('000$)	5	49	-	42	981	6	17	18	29	27
	Unit	1	6	-	3	226	2	1	4	7	7
	Average	4775	8,085	-	13,944	4,342	3,189	16,919	4,489	4,127	3,827
Vertical Lathe	Value ('000$)	-	57	-	104	41	42	65	-	-	7
	Unit	-	4	-	1	2	2	1	-	-	8
	Average	-	14,252	-	104,478	20,666	21,000	64,597	-	-	813
Other Lathes	Value ('000$)	-	300	-	183	2,025	20	4	198	120	122
	Unit	-	45	-	28	652	8	2	12	46	46
	Average	-	6,676	-	6,522	3,106	2,551	2,242	16,514	2,606	2,656
Radial Drilling M/c	Value ('000$)	-	29	-	32	674	32	22	14	26	43
	Unit	-	3	-	8	189	8	1	3	10	11
	Average	-	9,775	-	4,036	3,569	3,979	21,550	4,507	2,556	3,878
Other Drilling M/c	Value ('000$)	-	54	-	63	221	189	24	23	41	213
	Unit	4	17	-	556	1,403	92	1	284	542	1,968
	Average	3 8	3,172	-	114	158	2,051	23,925	82	75	108
Horizontal Boring M/c	Value ('000$)	-	625	7	375	660	2	28	44	96	50
	Unit	-	26	1	6	33	1	1	1	4	2
	Average	-	24,048	6,761	62,591	20,020	1,500	28,000	44,278	23,897	25,139
Jig Boring M/c	Value ('000$)	19	720	354	6	266	97	-	-	37	34
	Unit	1	22	8	1	13	5	-	-	4	1
	Average	18,869	32,750	44,278	6,222	20,448	19,336	-	—	9,300	34,000

		Cummunist China	U.S.S.R	Canada	U.S.A.	Mexico	Brazil	Rep of S Africa	Austra-lia	Others
Other Boring M/c	Value ('000 $)	82	-	5	333	149	4	1	6	23
	Unit	8	-	3	16	28	9	3	5	61
	Average	10,262	-	1,788	20,830	5,327	423	438	1,212	372
Planomiller	Value ('000 $)	-	-	-	-	-	-	-	42	-
	Unit	-	-	-	-	-	-	-	1	-
	Average	-	-	-	-	-	-	-	41,786	-
Other Milling M/c	Value ('000 $)	598	129	367	4,138	128	318	119	331	66
	Unit	68	15	41	695	13	3	11	44	23
	Average	8,788	8,607	8,953	5,954	9,852	106,125	10,852	7,525	2,891
Planer	Value ('000 $)	-	-	12	-	-	-	-	11	39
	Unit	-	-	1	-	-	-	-	1	8
	Average	-	-	12,161	-	-	-	-	11,003	4,898
Internal Grinding M/c	Value ('000 $)	250	-	-	31	-	-	-	2	7
	Unit	22	-	-	4	-	-	-	5	2
	Average	11,373	-	-	7,804	-	-	-	396	3,458
Surface Grinding M/c	Value ('000 $)	172	54	27	217	16	-	6	12	50
	Unit	30	8	2	51	2	-	44	4	18
	Average	5,758	6,711	13,500	4,249	8,235	-	1,419	3,013	2,778
Other Grinding M/c	Value ('000 $)	762	418	106	848	16	12	70	176	275
	Unit	105	44	410	221	8	3	590	121	1,719
	Average	7,257	9,498	259	3,836	1,970	3,919	119	1,455	161
Hobbing Machine	Value ('000 $)	112	68	19	195	3	-	25	3	17
	Unit	8	16	2	16	1	-	2	1	4
	Average	14,055	4,266	9,736	12,216	3,200	-	12,367	2,633	4,206
Gear cutting and Finishing machine	Value ('000 $)	63	-	-	-	3	6	-	-	5
	Unit	29	-	-	-	1	1	-	-	12
	Average	2,175	-	-	-	2,669	6,022	-	-	380
Metal Sawing M/c	Value ('000 $)	-	-	28	241	2	-	33	17	61
	Unit	-	-	356	338	4	-	101	10	370
	Average	-	-	80	715	480	-	331	1,669	165
Other M/c Tools	Value ('000 $)	65	106	41	137	92	5	41	40	107
	Unit	21	30	11	454	18	2	118	80	782
	Average	3,116	3,542	3,727	301	5,115	2,335	347	497	392

Appendix - 21

Leading Chambers of Commerce and Manufacturing or Trade Associations in Japan

(A) Chambers of Commerce

1. Fukuoka Chamber of Commerce and Industry
   No. 1669-8, Nishinakssu, FUKUOKA.
2. Kobe Chamber of Commerce and Industry, No.16
   1-chome, Kaigandori, Ikuta ku, KOBE.
3. Kyoto Chamber of Commerce and Industry
   Karasumarudori, Nakagyo-ku, KYOTO.
4. Nagoya Chamber of Commerce and Industry, No.1
   4-chome, Chike-cho, Naka-ku, NAGOYA.
5. Osaka Chamber of Commerce and Industry, No.1
   Dojima, Nishi-machi, Kita-ku, OSAKA.
6. Japan Chamber of Commerce and Industry, No.14
   3-chome, Marunouchi, Chiyoka-ku, TOKYO
7. Yokohama Chamber of Commerce and Industry
   No.11, Nihonohdori, Naka-ku, YOKOHAMA.

(B) Manufacturing or Trading Associations

1. Japan Foreign Trade Council, Inc., No.3
   7-chome, Nishi-Oinza, Chuo-ku, TOKYO.
2. Tokyo Foreign Trade Association
   c/o Tokyo Metropolitan Government
   No.1, 3-chome, Marunouchi, Chiyoda-ku, TOKYO.
3. Yokohama Foreign Trade Association, No.1
   1-chome, Kaigan-dori, Naka-ku, YOKOHAMA.
4. Nagoya Foreign Trade Association, No.1
   4-chome, Chike.cho, Naka-ku, NAGOYA.
5. Kyoto Foreign Trade Association, Karasumaru-dori
   Nakagyo-ku, KYOTO.

6. Osaka Foreign Trade Association, Hashizume-che,
Uchiken-machi, Higashi-ku, OSAKA

7. Kobe Foreign Trade Association, No. 126, Higashi-machi
Ikata-ku, KOBE.

8. Japan External Trade Organization, 2, Akasaka
Aoi-che, Minate-ku, TOKYO.

9. Japan Machinery Importers Association, Shoke-Kairan
No. 1, Sannel-che, Chiyoda-ku, TOKYO.

10. Japan Machine Tool Builders Association
21-1, Shiba-Koen
Minato-ku
Tokyo.

11. Japan Machine Tool Trade Association
Kikai-Shinko Building
21-1-5, Shiba-Koen
Minato-ku
Tokyo.

12. Machine Tool Traders Association of Japan
No. 400, Shiba-Kotohira Cho
Minato-ku
Tokyo.

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List of Interviews made by Survey Team

JAPAN

Dates of Visit: 18.6.1968 to 25.6.1968

	IIMC	DCo
Team Members:	Mr R.C. Jain	Dr R. Singh

Name of Firm/Organization	Persons Interviewed	Designation
(A) Manufacturers:		
1. Makino Milling Machine Co Ltd 3-19 Nakane 2 Chome Meguro Ku Tokyo	(1) Mr Tsunezo Makino	President
	(2) Mr Masatoshi Shimizu	Managing Director
	(3) Mr Keisuke Kimura	Secy to the President
	(4) Mr K. Miura	Planning Dept
2. Hitachi Limited Nippon Building No.1, 2-chome Ohtemachi, Chiyoda Ku Tokyo	(1) Mr Ryozo Amano	Chief of Machine Tools Section, Precision Machine Dept, Electric Utility & Industrial Machinery Divn.
	(2) Mr Koichi Takase	Assistant Manager, 2nd Section, Industrial Machinery Dept, First International Sales Office.
3. Hitachi Limited Nippon Building No.8 2-chome Ohtemachi Chiyoda Ku Tokyo.	(1) Mr Ryozo Amano	Chief of Machine Tool Section
	(2) Mr Koichi Takase	Asstt Manager.
	(3) Mr R. Nishida	Manager - International Sales.

Name of Firm/Organization	Persons Interviewed	Designation
4. Okuma Machinery Works Ltd Export Department Dai Nagoya Building Hiroi-Cho Nakamura Ku, Nagoya	(1) Mr S. Masumoto (2) Mr S. Himuro (3) Mr T. Tsshiki	Director Chief of Export Section Section Asstt.
5. Hitachi Seiki Ltd 1, Abiko Machi Chaibakon	Mr K. Tatsuoka	Director & Plant Superintendent
(B) Users		
1. Nissen Motors 7, 6-Chome, Ginza Higashi Chuo Ku, Tokyo	(1) Mr K. Terashima (2) Mr Takashi Matsuura	Buyer Purchase Dept Chief - Machinery Section Purchasing Department
2. Nikko Electric Co Ltd No. 12-11, 1 Chome Higashi Rokugo Ohta-ku, Tokyo	(1) Mr Motosato Goto (2) Mr H. Togo (3) Mr Saburo Yoshino	Director & Plant Supdt Manager, Planning Dept Sales Manager
3. Nissan Motor Co Ltd 2 Takaracho Yokohama	Mr Kinichi Tamura	Chief of Production Engineering Section - Engine Plant
4. Nippon Electric Co Ltd 7-15 Shiba Go Chome Minato Ku, Tokyo	Mr Mizuo Kanoko	Asst Manager, First Mfg. Engg Dept Switching Dvn
5. Nippon Sharyo Seizo Kaisha Ltd (Japan Rolling Stock Mfg Co Ltd) 1-1 Sanbonmatau Cho Atsuta Ku, Nagoya	(1) Mr Y. Mizuno (2) Mr K. Yamaguchi (3) Mr Y. Mochizuki	Chief - Equip Section Chief Export Section Export Section

Name of Firm/Organization	Persons Interviewed	Designation
(C) Government Officials/Associations :		
1. Japan Chamber of Commerce Tokyo	Mr Y. Sakamato	Section Chief, International Affairs Section
2. Machine Tool Traders Association of Japan No.40,Shiba-Kotohira Cho Minato Ku, Tokyo.	Mr M. Inada	Managing Director
3. Japan Machinery Importers' Association 4-2, 3-Chome Kasumigaseki Chiyoda-Ku, Tokyo.	(1) Mr Kinichi Omata (2) Mr Kojima	Asstt Secretary Staff Assistant
4. Japan External Trade Organization Machinery Division No.2, Akasaka Aoi Cho Minato Ku, Tokyo	Mr Saburo Ikagashi	Chief International Division
5. Atake & Company Ltd Ohtemachi Building 1-Chome, Ohtemachi Chiyoda Ku, Tokyo	(1) Mr Yamazaki (2) Mr R. Takayama (3) Mr K. Horii	Sales Manager
6. Okura Trading Co Ltd 2, Ginza Nichome Chuoku, Tokyo	(1) Mr George S. Kuwabara (2) Mr Asakawa (3) Mr S. Yoshitake	Chief Machine Tool Dept Machine Tool 1st Section Machine Tool 1st Section Machine Tool Dept
7. Japan Machine Tool Trade Association Kikai-Shinko Building 21-1-5 Shibakoen Minato Ku Tokyo.	(1) Mr Mitsuo Ueda (2) Mr Akira Nogami	Managing Director

Name of Firm/Organization	Persons Interviewed	Designation
8. Ministry of International Trade & Industry MITI Building Tokyo	Mr S, Yoshizawa	Section-in-Charge Industrial Machinery Section in Heavy Industry Bureau
9. Japan Machine Tool Builders' Association 21-1 Shibakoen Minato-Ku Tokyo	(1) Mr Kazuo Sugiyama (2) Mr H. Hakojima	Executive Director Manager
(D) Others:		
1. Ebara Vocational Training Workshops, Tokyo Metropolitan Government 8-8, 6-Chome, Nakanobu Shinagawa Ku, Tokyo	(1) Mr Shigesuke Tsuchiya (2) Mr Yamaguchi	Director Asstt Director
2. Trade Times Ltd Tokyo	Mr M. Okkawara	Editor
3. The Export Import Bank of Japan 5-5, 1-Chome, Otemachi Chiyoda Ku, Tokyo.	Mr Yoshito Kimura	Coordination Dept

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FOREIGN MARKET SURVEY REPORT

AUSTRALIA AND NEW ZEALAND

Preface

This report is divided into two parts:

Part I deals with Australia;

Part II deals with New Zealand

The sections and appendices for both parts are numbered continuously.

FOREIGN MARKET SURVEY REPORT

AUSTRALIA AND NEW ZEALAND

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PART I - AUSTRALIA

1. Introduction

Australia is by and large an agricultural economy. However, in recent years the Australian industrial output is almost at par with her farm output.

Australia measures approximately 2,500 miles from east to west and 2,000 miles from north to south. The estimated population is about 11 million of which Sydney accounts for 2.2 million, Melbourne about 2 million, Adelaide about 0.6 million and Perth about 0.45 million.

Australia is a big importer of machine tools. Her machine tool imports total 37.4 U.S. $ in 1967. She may be considered as an industrially advanced country.

Her natural resources include high quality of iron ore and coking coal of higher grade, thus providing the necessary base for further industrialisation.

2. Economic and Business Outlook

Australian industry is undergoing an unprecendented period of expansion. It faces many problems, including relatively high cost of production owing to high costs of transportation and essential imported materials and high labour cost, mostly arising from shortage of manpower and high standard of living. The following table shows employment of secondary and tertiary activities in Australia. Manufacturing Industries account for as much as one third of the people employed in secondary and tertiary activities. Utilities, transport and communication industries account for another 11.5% of employment in this sector.

Table 1

Australia: Sectorwise Breakdown of Persons Employed in Secondary and Tertiary Activities - 1967

	Sector	Employed %
1.	Manufacturing	33.8
2.	Commerce	17.2
3.	Community & Business Services..	13.2
4.	Building and Construction ..	8.1
5.	Transport & Storage ..	5.9
6.	Amusements, Hotels.. ..	5.2
7.	Finance & Property.. ..	4.6
8.	Public Authority N.E.I. ..	4.6
9.	Communication	2,8
10.	Electricity, Gas, Water ..	2.8
11.	Mining & Quarrying.. ..	1.4
12.	Forestry, Finishing & Trapping	0.4
		100.0

The most striking feature of the sectional composition of the Australian workforce is the growth of tertiary employment. This has outstripped manufacturing industry. While, the proportion of Australian employment in industry has remained relatively steady at nearly 40% of total civilian employment, the numbers in tertiary occupations reached a record level of 41.7% of the workforce,in 1967.

Within manufacturing industries, the Foundry, Engineering and Metalworking Industries absorb one out of every three workers. The table below shows sectorwise breakdown of employment in manufacturing industries.

Table 2

Employees in Manufacturing Industry, 1967

	Manufacturing Industry	% Employed
1.	Foundries, Engineering and Metalworking ..	33.1
2.	Textiles, Clothing	14.8
3.	Transport & Equipment	13.3
4.	Food, Drink & Tobacco	13.2
5.	Building Material	7.3
6.	Chemical & Allied Industries ..	5.0
7.	Other	13.3
		100.0

Metalworking industries account for more than 43% of total industrial output. ($ 6,042 million out of a total output of $ 14,719 million). There are some 27,549 establishments employing 601,637 persons. Metalworking industries are therefore very important in the Australian industrial complex. Machine tool consumption in Australia should, therefore, steadily increase as the industrial sector expands. It follows from table 3 that the largest industrial concentrations are in New South Wales and Victoria (69.3% of total factories and 74.1% of industrial employment); followed by Queensland and South Australia. These four states account for 88.6% of the total factories in Australia and 92.3% of industrial employment.

Table 3

Australia : Statewise Distribution of Factories - 1966

	N.S.W.	VIC	QLD	S.A.	W.A.	TAS	N.T.	ACT	TOTAL
Factories (No.)	24,531	17,980	6,010	6,065	4,906	1,792	185	217	61,686
Persons Employed ('000)	519	439	117	118	60	34	1	4	1,294
Gross Value of Output U.S. $ m	6,864	5,134	1,677	1,411	754	449	16	36	16,338
% of Total Factories	40.0	29.3	9.7	9.6	7.8	3.0	0.3	0.3	100.0
% of persons Employed	40.1	34.0	9.1	9.1	4.6	2.6	0.2	0.3	100.0
Percent of Total Australian Population	36.6	27.9	14.4	9.5	7.2	3.2	-	0.1	100.0

NSW - New South Wales;
VIC - Victoria;
N.T. - Northern Teritories
QLD - Queensland;
S.A. - South Australia;
W.A. - Western Australia;
TAS - Tasmania
ACT - Australia Central Teritories.

Development of Engineering Industries

The main metalworking industries in Australia are automobiles and consumer durables like domestic appliances.

Table 4 gives trend in investment in manufacturing industries.

Table 4

Australia : New Capital expenditure by manufacturing industry[1]
(Value in million US $)

Sector	1960-1961	1961-1962	1962-1963	1963-1964	1964-1965	1965-1966
Total Manufacturing of which	1,197	1,225	1,270	1,321	1,713	1,963
Engineering including Vehicles[a]	474	490	529	562	710	835
Other manufacturing (chemicals, paper & pulp, textiles clothing, food etc)	723	735	741	759	1,003	1,128
% engineering/total manufacturing	39.6	40.0	41.6	41.8	41.5	42.0

(a) Includes extraction, refining and foundry
(1) Development in Australian Manufacturing Industry 1965-66 Department of Trade & Industry.

Thus the relative importance of engineering industries has been steadily increasing recently, rising between 1960-61 and 1965-66 from 39.6% to 42.0% of the total investment of 880 million dollars in manufacturing industry.

There are four large automobile manufacturing plants. Hundreds of small ancillary units exist to manufacture components, parts, and sub-assemblies to feed the automobile manufacturing plants. Next in importance is the Machinery industry, including Machine Tool manufacture.

There are about twenty large firms engaged in the manufacture of heavy engineering machinery and equipment, producing machinery to a rolling mill construction, mining and crushing equipment, hydraulic and extrusion presses, diesel locomotives, machine tools, materials handling equipment (cranes), earthmoving machinery and ship propulsion plant. Appendix 1 gives an indication of the composition of the Australian metal fabricating industry in 1962-63.

3. Demand for Machine Tools

3.1 Aggregate Demand

The present capacity of Australian Machine Tool industry is not sufficient to meet domestic demand. Only 40% of the demand for lathes and 25% for other machines are met by the domestic establishments. The rest has to be imported.

3.2 Vocational Institutes

An increasing number of trade-schools and vocational institutes are being opened recently. An ambitious plan to open further schools is envisaged by all states and New South Wales, Victoria, South Australia and Western Australia, in particular.

They provide good market for simple type of machine tools. Most of their purchases are through the procuring departments of various state governments. As a matter of policy they do not buy anything foreign so long as Australian makes of equivalent specifications are available.

However, boring, milling and drilling machine requirements have to be met by import in absence of domestic production.

4. Australian Machine Tool Industry

The machine tools produced for the metalworking industry include presses (mechanical, manual and hydraulic), bending machines, shearing and punching machines, guillotines, drop and pneumatic hammers etc.

Australia manufactures only a limited type and range of machine tools - Lathes up to about 1,000 mm swing, radial drills, grinders, power presses (clearing and Bliss collaboration) and special purpose machines for the automobile industry. The number of manufacturers of machine tools has actually declined since the War because of easier import availability and high cost of Australian labour.

Table 5 shows the value of production of machine tools in recent years.

Table 5

Australia : Production of Machine Tools
(in Million US $)

Year	Production		
	Lathes	Other Machine Tools	Total
1961-62	1.88	4.34	6.32
1962-63	2.55	3.90	6.45
1963-64	2.65	2.87	5.52
1964-65	3.62	3.30	6.92
1965-66	3.28	3.65	6.93

Source: Department of Trade and Industry, Adelaide.

Production of machine tools in Australia chiefly comprises metalworking lathe manufacture. They are producing centre lathes up to 42" swing, 24'6" bed, copying lathes, capstan and turret lathes, sliding, surfacing, screw cutting, and brake drum turning lathes. Recently manufacture of grinders and of small drilling machines (bench type) has also been undertaken. McPherson, a leading machine tool builder in Australia has developed numerically controlled units for general purpose machines, reportedly with their own technology. Their first unit was inaugurated in July 1968.

5. Import of Machine Tools

The rapid growth of engineering industries in Australia means a large market for machine tools. Since the domestic machine tool industry is as yet manufacturing only some general purpose standard type machine tools, the entire demand for other types of machine tools is met by imports. There are no import restrictions or licencing for import of machine tools. However, tariff protection has been granted to local industries. Despite tariff protection, even simple machine tools like ordinary centre lathes of the type manufactured locally, find their way into the Australian market, particularly from Japan. As a matter of fact, local machine tool manufacturers have quite recently charged the Japanese of dumping machine tools (lathes in particular) into Australia and have therefore sought an increase in protective tariffs.

5.1 Imports by Type of Machine Tools

Annual import of machine tools into Australia amounts to more than U.S. $ 40 million. Australia is the biggest machine tool importer in the region. Table 6 gives the typewise breakdown of machine tools import into Australia for the year 1966-67.

5.2 Imports by Supplying Countries

The U.K., West Germany, Japan, U.S.A., and Switzerland are important suppliers of machine tools to Australia. Of course, U.K. products have special tariff preference. Imports from Germany, U.S.A. and Switzerland have consisted mainly of items which U.K. does not manufacture. Special purpose machines are imported from the U.S.A. and West Germany, precision machines from Switzerland. Japan supplies general purpose machines.

Table 6

Machine Tool Imports into Australia by Types, 1966-67

Sl. No.	Type of Machine	No.of units	Value in '000 US $	% of Total	Average value per unit in '000 US $
1.	Combined boring drilling, milling machine	23	1,039	3.1	45
2.	Combined boring and reaming; boring and drilling or boring, drilling, & reaming machine	7	178	0.5	25
3.	Vertical boring machine	28	465	1.4	17
4.	Horizontal boring machine	51	677	2.0	13
5.	Other boring machine	50	1,698	5.0	34
6.	Drilling (Radial Drills)	247	581	1.7	2
7.	Other drilling machines	950	837	2.5	1
8.	Grinding, honing, lapping or polishing machine, centre type cylindrical grinding machine	69	497	1.5	7
9.	Centreless grinding machine	21	107	0.6	9
10.	Internal Grinding machine	19	295	0.9	16
11.	Surface grinders	561	833	2.4	1
12.	Tool cutter and grinding machine	590	543	1.6	1

Table 6 (Cont'd)

Sl. No.	Type of Machine	No.of units	Value in '000 US $	% of Total	Average value per unit in '000 US $
13.	Power Operated machine n.e.i	1,826	1,416	4.2	1
14.	(a) Lathes and chucking machine. Full automatic lathes (single spindle)	123	1,216	3.6	10
	(b) Full automatic lathes (multi-spindle)	30	863	2.5	29
15.	Capstan Lathes	114	739	2.2	6
16.	Roll Turning Lathes	2	321	0.9	161
17.	Turret Lathes	65	783	2.3	12
18.	Screw Cutting Lathes	38	792	2.3	21
19.	Other Lathes	1,056	3,143	9.2	3
20.	Combined milling, shaping, drilling & turning machine	30	279	0.8	9
21.	Milling Machine	1,112	4,998	14.7	4
22.	Hobbing machine	16	123	0.4	8
23.	Broaching machine	16	286	0.8	18
24.	Planning & shaping machine	1	39	0.1	39
25.	Gear shaping machine	23	239	0.7	10
26.	Others	139	207	0.6	1
27.	Slotting machine	26	80	0.2	3
28.	Sawing and filing machine	4,424	685	2.0	-

Table 6 (Cont'd)

Sl. No.	Type of Machine	No.of units	Value in '000 US $	% of Total	Average value per unit in '000 US $
29.	Screwing, chasing or tapping machine	281	432	1.3	2
30.	Cutting, shearing, slitting or nibbing machine	14	123	0.4	9
31.	Guillotine shears -				
	Hydraulic	18	315	0.9	18
	Mechanical	906	72	0.2	-
32.	Other Guillotine shears	973	1,827	5.4	2
33.	Forging, hammering bending, straightening, pressing or drawing machine	268	87	0.3	-
34.	Plate straightening machine	11	38	0.1	3
35.	Metalworking presses, n.e.i.	73	424	1.2	6
36.	Mechanical presses	131	804	2.4	6
37.	Other types of presses	1,412	3,822	11.2	3
38.	Metalworking machine n.e.i.	831	2,006	5.9	2
	Total ..	16,575	33,999	100.0	2

Japan's performance in the Australian market during the last few years have been spectacular, mainly due to their relative price advantage. Recently, low grade simple types of machine tools from Taiwan have also appeared in the Australian market. For the past four to five years, machine tools from the Communist Bloc. particularly from Czechoslovakia, have also been making considerable headway impact in the Australian market.

Appendix 2 summarises the breakdown of import of machine tools into Australia by type classified by country of origin for the year 1966-67.

5.3 The Importing States

New South Wales and Victoria account for 84 per cent of total imports (41 and 43 per cent respectively). The region around Sydney and Melbourne is the major market for machine tools and industrial machinery in Australia.

6. Tariff Barriers

There are certain problems in exploiting the Australian market. One serious barrier to Indian manufacturers is the Australian tariff preference accorded to U.K. Unlike in New Zealand, India and other Commonwealth countries are not treated on par with the U.K. by Australia. Consequently, British machine tools have a trade advantage over Indian makes and also, Japanese and Western and Eastern European makes.

The Table 7 gives the tariff structure for import of machine tools from the U.K. and other countries.

Table 7

Tariff on Import of Machine Tools into Australia

	Imports from countries other than U.K.	Imports from U.K.	Imports from LDC under quota*
Most Items made in Australia	40% of c.d.v.**	27½ of c.d.v.	25% of c.d.v.
Certain Items (Excluding those covered above)	27½ of c.d.v.	7½ of c.d.v.	7½ of c.d.v.
Essential Items - not made in Australia (Imports under bye law)	7½ of c.d.v.	Free	Free

* Current quota for imports from Less Developed countries under LDC preference is Australian $ 25,000 annually.

** c.d.v. means the current domestic value in the country of origin.

There is a difference of 20 per cent ad valorem in the case of most items and 12½ per cent to a certain items. In fact, the tariff differential is much wider than it appears as the Australian Tariff structure levies tariff on the basis of the current domestic value (c.d.v.) in the country of origin rather than the landed price c.i.f. Therefore, the burden of duty on imports from India is greater in relation to the export price than it is on imports from other countries whose domestic prices for machine tools is as rule lower than that of India. As a matter of fact, in the case of imports from Iron Curtain countries, where no price system operates, domestically it is very difficult to make any realistic assessment of c.d.v. The Australian Customs consequently has to take whatever c.d.v. value is computed on the basis of the CIF price, after allowing for insurance and freight.

Therefore, the existing Australian tariff structure is unfavourable to India and poses the single most important hurdle in tapping on otherwise promising market. The same problem applies to exports of other manufactured goods from India to Australia. Hence, this matter requires immediate attention at the highest Government level.

Recently, as a taken guesture of goodwill, certain preferences on imports from less developed countries have been announced by the Australian Government. This has proved to be national as the total annual quota for imports of machine tools into Australia from all less developed countries is only A$ 25,000 or only 0.08% of total imports as against total import of A$ 31 million worth of machine tools.

7. Export of Australian Machine Tools

The main export markets are Canada, New Zealand and Malaysia. Some exports have also been made to the United Kingdom, Pakistan, Thailand, Burma, Kenya, New Gunea, Jamaica, Rhodesia and other countries. Table 8 shows export of machine tools from Australia in recent years.

Table 8

Export of Machine Tools from Australia

Year	Year	No.	Value in '000 US $
	1962-1963	83	125.5
	1963-1964	213	503.4
	1964-1965	180	314.2

8. Summary of Findings and Recommendations

8.1 Product Design and Types

Australia is a good market for general purpose machine tools like lathes, milling machines, drilling machines etc. There is some scope also for sheet metal working machinery, except for presses (manufactured in Australia in collaboration with clearing and Bliss, U.S.A.)

8.2 Pricing

India must follow the pricing policy adopted by Japan in the initial years of its entry into the Australian market. Japanese machine tool manufacturers initially marketed their machine tools at very low prices and then gradually raised their prices after their products had established a good reputation in the market. Within seven years of their entry into the Australian market they have raised their prices by nearly, 40 per cent. They are now making a margin of profit of 10 to 15 per cent, and more in certain specialised and more sophisticated lines.

Further during the introductory period, Japanese machine tool manufacturers delivered their machines on consignment basis for periods up to 18 months. However, such sales stipulated that in case a machine is returned, one way freight and incidental expenses would be borne by the Australian dealer. This gave a sufficient incentive to the dealer to make serious efforts to sell the machine. Japanese manufacturers still continue with the above practice in introducing new models. Once they are established in the market, sale on consignment basis is discontinued.

8.3 Packing

Poor packing is another major problem. It has been found that almost all of the limited number of consignments from India arrived in Australia in a rusted or damaged condition. These difficulties have arisen primarily because of lack of knowledge of transit conditions. Direct shipping from India to Australia is infrequent. Transhipment at Singapore is generally the rule. The rough unloading and loading and exposure in the saline atmosphere of the docks damages the crates and their contents unless extra care is taken in packing.

Part of the problem is that shipping services between India and Australia are inadequate. Until August 1968, there was no direct line between India and Australia. As a result, the transit period for a machine was as high as 35-40 weeks, higher than imports from other countries. In August 1968, the Shipping Corporation of India was reported to have started a direct service, probably once every two months, between Sydney and the West Coast of India.

8.4 Distribution

Competition is so intense that it is very difficult among existing distributors to find experienced and established distributors to represent machine tools manufactured by India. Most of the established Australian distributors are already representing U.K., Continental, Japanese, American,East European and Taiwan machine tool manufacturers.

Indian manufacturers have tried to make a start in Australia. They are experiencing serious difficulties in getting interested and experienced machine tool distributors to promote sales of Indian machine tools. HMT and Kirloskars who have been trying to export to Australia, have had bitter experiences during the past few years. The distributors with whom they began their sales effort have been inactive. They did not accomplish anything significant beyond, tagging the name of HMT and Kirloskar at the bottom of their list of agencies or representations.

The biggest task facing the Indian machine tool exported to Australia is creating a distributor network.

These Indian manufacturers are now establishing their own sales and service organisation in close collaboration with some business firms. These Australian firms do not have previous experience in manufactured machine tools but are willing and interested in making the necessary investment and efforts in marketing Indian machine tools in Australia.

8.5 Competition

Since Australia manufactures only a limited range and quantity of machine tools and the demand for machine tool is high because of its rapid rate of industrialization machine tool manufacturers from all over the world are vying with each other for the market. More than 60 countries are trying to market their machine tools in Australia.

8.6 Lack of Image

The lack of an industrial image as far as India is concerned is an important deterrent to acceptance of Indian machine tools. The image of India prevailing in the Australian mind is that of a hungry, poor and backward nation. When they talk of Indian exports they think of tea, jute, and textile. Hence, as a prelude to marketing Indian machine tools in such countries, India must undertake a massive campaign to make known its industrial progress and achievement since Independence.

8.7 Sales Promotion

8.7.1 Industrial Fairs

Australians like others do not buy anything without first seeing performance demonstrated. To promote the sale of Indian machine tools in Australia, well planned and effective participation in the exhibitions that are held every 3-4 years at Sydney or Melbourne is mandatory.

More important than mere participation is the way one participates. Manufacturers and promotion officials must view an exhibition as a "sales stall", and not merely as a "show-place". Efforts must be made to assure that items chosen for exhibition are ones that would find a ready market in the country where the exhibition is being held. Machines must be shown working with chips flying, operators in overalls turning out finished products - a workshop atmosphere attracts the real buyers. Necessary sanctions for participation must be made well in advance. It was pointed out to the Survey Team when others were ready with their pavilions, Indians were trying to contact contractors to build their pavilion.

Whenever a new machine is newly introduced, demonstrations must be held and important prospective customers must be invited. Once a machine is sold, installed and working satisfactorily in a plant, the visit of prospective customers to that plant must be arranged.

8.7.2 Sales Literature

Catalogues must be prepared taking British, German, Japanese and American competition, who have sales structured of high quality. Catalogues and other literature circulated among prospective customers must be well written and printed on good quality paper. They must answer querries which a technician would normally raise about the product and give the technical details which he needs.

Care must be taken to exclude older model machine tools from catalogues and manuals, which give an impression that the technological level of Indian manufacturers is far behind that of other countries.

8.7.3 Personal Contacts

Display and demonstration at exhibitions or show rooms must be followed up by personal contacts with prospective clients. Customers must be regularly visited to and build mutual confidence.

8.8 Prospects for Indian Machine Tools

Australia is clearly a promising export market for Indian machine tools. Further, the type of machine tools Australia imports are mostly within the product range of the Indian Machine Tool Industry. Moreover, Australia is used to working with British and continental makes of machine tools, with whom Indian manufacturers have most of their collaboration agreements. This suggests that Indian machines of comparable quality and type would be accepted in the Australian market if the necessary marketing efforts were undertaken.

PART II - NEW ZEALAND

9. Introduction

New Zealand consists of two large and a number of small islands, stretching over more than 100 miles of the South Pacific. The total area of the country is more than 1,00,000 sq miles.

Wellington, the capital, along with the neighbouring industrial suburb of Lower Hutt has a population of 2,00,000. Auckland and Christchurch have a population of 1,51,000 and 1,63,000 respectively.

Annual import of machine tools into New Zealand amounts to 5.3 million US $.

10. Economic and Business Outlook

A new economic and social order may be beginning in New Zealand. Several decades of full employment have produced an inward looking economy. Some circles feel that this economy would benefit from an international orientation. The tightening of import and exchange controls, while designed to strengthen the economy, and restore confidence in the New Zealand dollar, will apply strong pressures on inefficient or wholly domestically oriented sectors of industry. Investment and labour into industries which, are likely to be channelled can increase exports. This policy of restraint to correct an adverse balance of trade is expected to continue.

The growth rate is expected to sustain a 4% per annum rise in the GNP at current prices, which, in terms of constant price, is as low as an increase of 1% per annum. The standard of living between now and 1975 may not increase at the high rate achieved between 1960 and 1967, which was 2.4 per cent per year in "real" terms.

Economic forecasts indicated that the population of New Zealand will reach 3.3 million in 1975. The total workforce by 1975 would rise to 1,250,000.

Even in 1975, an important part of the New Zealand economy is expected to be based on primary products. The facing demand for crossbred wools, the growing world shortage of beef, and the closer economic ties with an expanding Australia, is expected to switch the agricultural sector towards beef farming and increasingly away from sheep.

As regards non-agricultural sectors, the production of iron and steel will reach 300,000 tons annually, which will constitute approximately 50% of the country's requirements at that time. Secondary industries, after expanding at an annual average rate of 9% from 1962 to 1967, may grow by 5% per year till 1976. These industries are expected to employ approximately 26% of the total workforce. At 1967 prices, the output of secondary industries is estimated at 2,905 million US $

The general outlook for the New Zealand economy is expected to be more optimistic after 1975 and a stronger growth pattern during 1976-1980 is anticipated.

Agriculture is an important part of the New Zealand economy. Appendix 7 which gives sectorwise employment statistics, however, also shows that about 40% of the working force is absorbed by manufacturing industries. Of the total employment in manufacturing industries, about 30% is accounted by engineering and metalworking industries. This shows the important role that engineering industries play in the national economy.

In recent years, engineering industries have been growing steadily at 5% per annum and metal working and engineering industries now account for 25% of total manufacturing output. Sectorwise production statistics and indices show that manufacturing industries play a vital role in the national economy and that the relative rate of growth in manufacturing industries has been higher than that of the total engineering sector. (The respective index numbers /base 1954-55/ being 200 and 161 in 1966-67 as shown in Appendix 8).

In the past few years about 277 million US $ is invested by manufacturing industries in Land, Building, Machinery and Plant. The exact share for plant and machinery cannot be ascertained but it may be over 166 million US $ of which about 10% may be accounted by new machine tools installed.

The steady growth in engineering industries in New Zealand has been stimulated by mechanisation of the agriculture, increase in demand for consumer durables, and the high level of investment in the country. Table 9 shows that 25%of the total output, 42% of total establishments and 31% of employment in manufacturing industry in 1965 was accounted for by engineering and basic metal industries.

The engineering industries in New Zealand include those manufacturing machine tools, steel drums, fork lift trucks, water jet engines, agricultural equipment including dairy and farm equipment machinery, as well as household appliances and automobile components. Two of the most important enterprises established recently are a wire rope factory and an aluminium sheet and foil mill. Plans are now being implemented to establish aluminium and copper fabrication plants in the country. Each of these plants will promote establishment of a number of factories to utilise its fabricated material.

One field of particular interest and significance is the growing manufacture of simple metal cutting and metalforming machine tools. This is discussed in detail in a later section. Although most of New Zealand's requirements of machine tools are met by imports domestic production is also increasing.

There are also several enterprises engaged in the manufacture of components and parts for mining and quarrying machinery; complete units for logging and saw mills hand and power concrete mixers, lawn mowers, etc.

Table 9

Output, Employment and Establishment in Engineering Industries

Economic Sector	Value of output (in '000 US $)	Number of establishment	Average of persons Employed	Value added in process of manufacture (in '000 US $
Manufacturing of which:	2,992,872	9,753	211,050	1,156,691
Engineering industries	736,690	4,098	64,591	324,903
1. Manufacture of metal products except machinery and transport equipment	156,569	647	13,118	78,590
2. Manufacture, assembly and repair of machinery (except electrical machinery)	145,291	778	13,890	72,350
3. Manufacture of electrical machinery apparatus, appliances and supplies	116,075	227	8,743	47,273
4. Manufacture of transport equipment	318,755	2,446	28,840	126,690
% Engineering industries/manufacturing	24.6	42.00	30.6	28.1
Basic metal industries	21,813	90	1,315	9,078
Total engineering industries incl. basic metal industries	758,502	4,188	65,906	333,979
% Engineering industries including basic metal industries/manufacturing	25.3	43.0	31.2	28.9

Source: New Zealand Official Yearbook, 1965, Department of Statistics, Wellington Industrial Production in New Zealand, Department of Statistics Publication 1964-1965.

Most of the establishments in the electrical machinery industry are engaged in the production of household electrical appliances, such as electric cooking ranges, refrigerators, home and commercial freezers, washing machines and miscellaneous items of common use such as vacuum cleaners and food mixers, etc. About 74,264 refrigerators, 44,424 electric ranges and 55,000 vacuum cleaners are produced per annum. The thirty-four establishments producing radio and television sets, manufactured 79,525 radio sets and 53,945 T.V. sets (See Appendix 9).

There are seventeen enterprises engaged in the assembly of motor vehicles - cars, buses, vans and trucks. Production of passenger cars is about 58,000 units per annum while output of other commercial vehicles is about 10,000 units per annum. Value of output was 77 million US $ in 1960 and 121 million US $ in 1964-65. In addition to assembly lines for cars and motor vehicles, there are eighty-six establishments engaged in building bodies for buses, cars, etc., and about 2,000 workshops engaged in the repair of motor vehicles.

Table 9 and Appendix 10 give statistics on the structure of some industries in 1965. Appendix 11 shows factory production statistics for the years 1955-56 to 1965-66.

11. Demand for Machine Tools

The end-user industries for machine tools in New Zealand are mainly manufacturers of consumer durables like household appliances, manufacturers of dairy and farm equipments and general engineering workshops. Machine tools, are also required by general engineering workshops including repair and maintenance shops for the railways and Government workshops. Requirement of machine tools for vocational training institutes in New Zealand is not significant. New Zealand being short of manpower and a small country, does not need elaborate training programmes. Technical training schools account for a very small fraction of the total machine tool demand.

Auckland, Wellington and Christchurch account for as much as 75% to 80% of the industrial output of New Zealand. From this it can be concluded that an equivalent percentage of machine tool off-take in New Zealand could be accounted fof by these three major industrial areas. Important importers and distributors of machine tools are located either at Auckland or in Wellington.

Most of the end-user factories which were visited, with the exception of one or two, small workshops employing as few as 4 workers to a maximum of about 150 workers in the large units. New Zealand is now attempting to expand its market for manufactured products by export overseas so that industrial units can be expanded to economically viable sizes.

The New Zealand Government does not give any special encouragement to the metalworking and engineering industries. No economic incentives like accelerated depreciation or development rebates (for direct tax purposes) are available to machine tool buyers.

12. The New Zealand Machine Tool Industry

12.1 Production Statistics

Figures of domestic production of machines are not available.

Some idea about domestic demand for machine tools in New Zealand may be had from the inventory of metal cutting and metal forming machine given in Table 10. It is estimated that about 12 per cent of metalcutting and 8% of metalforming machines (numbering 1172) require early replacement. (See appendix 12 also)

The report of the survey by types of Metalworking Equipment in New Zealand carried out by the Manufacturing Federation, Wellington is reproduced in Appendix 13 which also indicates the number of machine tools requiring early replacement.

It is estimated that some 12-15000 metalworking machines will be bought by New Zealand industries in the next few years.

12.2 Types of Machine Tools Produced

There are no major machine tool manufacturers in New Zealand. There are about 12 manufacturers of (i) metal cutting machines - Hacksaws and Cold saws, (ii) sheet metalworking machines - Gullotines, plate bending rolls, (iii) simple grinding machines and (iv) miscellaneous items such as wood working and electric welding equipment etc.

Table 10

Stock of Machine Tools by Types - Year Ended 1967 Survey

	Number of Machines, By age						
	Under 5 years	5 years & under 10 Years	10 years & under 15 years	15 years & under 20 years	20 years and over	Total No of machines	Number stated to need early Replacement
GRAND TOTALS							
A. Numbers							
Metalcutting	1,536	1,149	1,052	1,026	1,570	6,333	807
Metalforming	1,158	1,117	800	504	880	4,459	365
	2,694	2,266	1,852	1,530	2,450	10,792	1,172
B. Percentages							
Metalcutting	24	18	17	16	25	(100)	13
Metalforming	26	25	18	11	20	(100)	8

Source: Manufacturing Engineers Federation, New Zealand.

13. Imports of Machine Tools

13.1 Aggregate Import

Most of New Zealand's requirements of machine tools have to be met by imports as domestic manufacture is insignificant. However, she offers an annual market of about 5 million US $ for foreign machine tools. Considering her size and small population the quantum is substantial.

13.2 Import by Type of Machine

Table 11 shows the imports ofmachine tools by New Zealand by types of machines. Lathes account for total about 25% of the value of machine tool imports. Grinding, milling and drilling machines are other major imports.

13.3 Imports by Supplying Country

The U.K. has been the biggest supplier with a 48% share of total imports. It is followed by West Germany, U.S.A., Australia, Japan and Poland in that order. India's share of total machine tools imported into New Zealand is negligible, being 0.8% in 1966.

Appendix 14 gives countrywise as well typewise import of machine tools into New Zealand during 1966. The U.S.A. and West Germany mainly supply special purpose machines. Japan, Spain and Italy have been important suppliers of general purpose machines. Switzerland is the most important supplier of precision machines.

Table 11

Machine Tools Imports
(Value in '000 US $)

Types	1963-64			1964-65			1965-66		
	Weight in Tonnes	Value	Average value per ton	Weight in Tonnes	Value	Average value per ton	Weight in Tonnes	Value	Average value per ton
Lathes	678	1,456	2	682	1,612	2	638	1,545	2
Drilling machines	161	288	2	230	378	2	161	282	2
Grinding machines	280	626	2	246	607	2	295	773	3
Milling machines	176	417	2	214	518	2	193	572	3
Other machine tools and general metalworking machines	1,630	3,221	2	1,411	2,546	2	1,398	2,925	2
Total ..	2,925	6,008	2	2,783	5,661	2	2,685	6,097	2

Source: Government of New Zealand.

14. Tariff and Non-Tariff Barriers

14.1 Tariff Rates

All commonwealth countries including India enjoy preferential tariff rate. No import duty is levied on machine tools imported from commonwealth countries. As against this, machine tools imported from non-commonwealth countries are subjected to import duty @ 40% of c.d.v. in the country of origin.

14.2 Import Licence

Machine tool imports are allowed under a quota system to established importers and specific import licenses are also issued to actual users. Import of machine tools under such licences is effected through a distributor representing the overseas machine tool manufacturer. No credit is extended by importers to end-users. End-users can however, make their own arrangements through their bankers or hire-purchase houses. There is no special agency financing procurement of plant and machinery in New Zealand. No special concessions in interest rates are given on loans for acquiring plant and machinery. Currently, New Zealand faces serious foreign exchange problems resulting from the continuous fall in international prices of primary commodities like wool and dairy products. Consequently, it has established rigorous controls in the grant of foreign exchange and import licenses. Actual users are given licences to import machines on the basis of merit. Only machine tools worth below 1,385 US $ can be imported under general quota licences granted to established exporters. The quotas have been more or less stagnant for the last few years. The likeliness of liberalising imports is not foreseen in the near future. The overall machine tool market in New Zealand is not only small, but is also further restricted by imposition of import controls.

For import of specified types of machines - drills (up to 7/8"), grinders (under 8" wheel dia), saws including abrasive cutoffs, guillotines, presses (up to 100 tons), punching and shearing, press brakes, bending rolls, bar and tube bending machines, licenses are considered on individual merits of the case.

15. Export of Machine Tools from New Zealand

An Export Incentive Licencing Scheme is in operation since 1st July 1965 in order to promote export of manufactured goods from New Zealand. Scheme applies to exports made, or on the declaration of intention to export.

The scheme is available to manufacturers of export goods and their agents, distributors and export houses. Under the scheme, licences can be issued for import of raw materials and components to be used in manufacture in New Zealand of goods for export, provided raw materials and components to be imported are not indigenously available.

Three different types of incentive licences are issued under the Export Incentive Schemes. These are (a) Replacement Licenses - available to manufacturers to the extent of their use of imported materials in the products for export for the domestic market; (b) Assistance Licences - available to manufacturers who intend to manufacture goods for export and use imported raw materials and components in manufacture thereof; (c) Bonus Licences - available to manufacturers who have exported manufactured goods in which licensed imported raw materials and/or components have been used whether the materials or components had been obtained under Replacement or Assistance Licences or under normal licences which have contained an allocation to cover export trade. Bonus Licences can be issued for any value not exceeding the difference between the f.o.b. value of the goods exported and the c.i.f. value of imported components and/or raw materials used in manufacture by exporters. Under Bonus Licences, besides importing raw material and components, plant and machinery (including machine tools) can be imported.

16. Summary of Findings and Recommendation

16.1 The Market

There is a good of demand for machine tools in New Zealand and the country is easily accessible to India. Unfortunately, the market is limited by the import licencing policy of the New Zealand Government, necessitated by the foreign exchange crisis facing the country.

New Zealand does not seem to have favourable conditions for domestic manufacture of machine tools. It is not likely to invest in machine tool manufacture on a large scale in the foreseable future.

16.2 Favourable Tariff

The basic factor which has enabled India to accomplish something concrete in this market has been the preferential tariff treatment accorded to India at par with the U.K. and Australia and other commonwealth countries. In the commonwealth countries, next to U.K., India is the second largest manufacturer of machine tools by quality and range of machines.

16.3 Present Position of India

Machine Tools thus exported from India to New Zealand have been mostly lathes from Kirloskar, HMT, Batliboi and Metro. Actually Indian machine tools are being imported since last 15 years and there are 200 or more Indian machines being used in New Zealand. In general, the quality of Indian machine tools are accepted as good. However, they have not been satisfied with the quality of service that the Indian machine tool manufacturers are providing through their distributors. Indian machine tool manufacturers have shipped on small things like paint, finish, providing necessary service, operation and repair manuals. The result has been that customers in New Zealand have been irritated. Service is important in New Zealand because most factories are small workshops without elaborate facilities of their own. In general, the image of India in New Zealand as a country manufacturing engineering goods has been found to be the best in the region under study.

16.4 Price

It may be noted from Appendix 10 that instead of over 100% Indian machine tools c.i.f. value is 56% of c.d.v. (current domestic value) as appraised by New Zealand customs for levy of import duty. This is an indication of the high domestic price of Indian machine tools, requiring price reduction (with the help of subsidies and other incentives) for competing in the export market.

16.5 Competition

Amongst Commonwealth countries, enjoying preferential tariff rates from New Zealand, India is the biggest manufacturer of machine tools next to Great Britain. The cost of production of machine tool manufactured in Great Britain is comparatively higher than that of India manufacture. Besides, geographically India is located closer to New Zealand than Great Britain; hence there is some freight advantage but the differential is largely wiped out by lack of direct service from India to New Zealand ports, resulting in heavy transhipment costs. (Direct shipping service from Great Britain to New Zealand is available.) The only competitor from Commonwealth countries is Australia which is closer to New Zealand than India, and which has a free bilateral trade agreement with New Zealand. However, the types and range of machine tools manufactured in Australia are limited. All these factors clearly pinpoint the opportunities for Indian machine tools in the New Zealand market.

16.6 Distribution System

Distribution of machine tools in New Zealand does not pose any serious problem. More than 80 per cent of the machine tools sales in New Zealand is concentrated in their three major industrial and commercial cities of Auckland, Wellington and Christ Church. There are in all about 12 importers of machine tools many of them having offices in Auckland and Wellington. A list of distributors is given in Appendix 16. Most of these importers also deal in industrial machines and allied lines. The three distributors who represent HMT, Kirloskar and Batliboi in New Zealand are top ranking in their line. They were found to be active and interested in Indian Machine tools, unlike others found elsewhere in the region. To help and augment the efforts of these distributors it would be wise for leading manufacturers/exporters of Indian machine tools to appoint a service-cum-sales engineer. It is further suggested that the Indian High Commission could take more interest in machine tool imports from India and help to establish closer liaison between the importers and distributors. It is suggested that in the early stage the High Commission must take the initiative to promote interest among local importers and provide them promptly with necessary information.

If the necessary measures are undertaken in the course of the next five years or so, India can have 15 to 20% of New Zealand's machine tool imports, which would mean an annual export of about 2.77 million US $.

16.7 Advertising and Promotion

The image of India as an industrial nation and as a manufacturer of quality engineering goods should be properly presented in Nee Zealand. There are various ways of doing this. T.V. shorts which show the progress achieved by India in the sphere of the industry would create a good background for Indian engineering products in New Zealand. Officials, industrialists and technicians, who are generally responsible for taking vital decisions in industry, business and public life should be invited to visit India to see for themselves the industrial progress made by India.

In Wellington and Auckland every alternate year an international trade fair is arranged. Active participation by Indian Industry in the exhibition would be essential to promote sales.

16.8 Quality and Standard

There has been a few cases of dissatisfaction due to import of cheap and low quality machine tools made by smaller Indian manufacturers. Some New Zealand buyers, not knowing the reputation of the Indian manufacturer/exporter have purchased machine tools of indifferent quality on the basis of Indian catalogues and pamphlets. Export of low grade machines jeopardise and lower the reputation of India. In the long interest export of low grade, cheap machine tools which do not maintain internationally acceptable standards should be watched very closely.

16.9 Production Abroad

Manufacture of Indian machine tools could be considered in New Zealand. New Zealand Government allows royalty up to 5% and encourages joint ventures on 50:50 basis with New Zealanders.

Australia : Metal Fabricating Industries, 1962-63

Economic sector	Value of output '000 US $	Number of establishment	Average number of persons employed	Value added in process of manufacture(a) '000 US $
Manufacturing of which:	14,097,778	59,363	1,167,000	5,878,179
Engineering Industries(b)	3,259,938	24,306	452,081	1,757,794
1. Plant, equipment and machinery (incl machine tools)	729,858	2,857	80,758	347,302
2. Other engineering	210,979	2,472	28,997	118,501
3. Electrical machinery, cables & apparatus	49,196	1,404	55,692	225,117
4. Tramcars and railway rolling stock	141,677	122	34,653	95,369
5. Motor vehicles, construction, assembly and repairs etc	1,063,375	13,623	135,579	499,862
6. Agricultural machine and implements	89,436	531	11,785	44,207
7. Wireless and amplifying apparatus	150,249	330	16,586	60,723
8. Sheet metal working, pipes, tubes, wire sewing machines etc and other metal works	747,679	2,614	73,813	323,651
9. Ship and boat building and repairing marine engineering	77,389	353	14,218	45,062
% Engineering industries/manufacturing	23.1	40.9	38.7	29.9
Basic metal industries(c)	735,033	33	35,605	241,510
Total engineering industries including basic metal industries	3,994,871	24,339	487,686	1,999,304
% Engineering industries including basic metal industries/manufacturing	28.3	41.0	41.8	34.0

Source: Yearbook of the Commonwealth of Australia: No. 51 Manufacturing Industries 1962-63, No.8 Metal Fabricating Industries, Commonwealth Bureau of Census & Statistics, Canberra, Australia.

(a) Value of output less value of material and fuel used.
(b) Individual industries.
(c) Smelting, converting, refining and rolling of iron and steel.

Appendix - 2

Machine Tool Imports into Australia by Type and Supplying Country 1966-67

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 U.S. $
1.	Combined boring, drilling and milling machines	23	1,039	45
	Germany (East)	1	8	8
	Germany, Federal Republic of	6	608	101
	Switzerland	2	38	19
	United Kingdom	12	169	14
	United States of America	2	216	108
2.	Combined boring and reaming, boring and drilling or boring drilling and reaming machine	7	178	25
	France	1	30	30
	Germany, Federal Republic of	2	57	28
	United States of America	1	80	80
	Other countries	3	11	4
3.	Vertical boring machines	28	465	17
	France	1	161	161
	Germany, Federal Republic of	3	121	40
	Japan	6	29	5
	United Kingdom	12	110	9
	U.S.S.R.	2	27	13
	Other countries	4	17	4

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 U.S. $
4.	Horizontal boring machines	51	677	13
	Czechoslovakia	1	21	21
	Germany (East)	7	88	13
	Italy	1	22	22
	Japan	2	49	24
	Spain	4	24	6
	United Kingdom	33	446	14
	United States of America	3	27	9
5.	Other boring machines	50	1,698	34
	Belgium-Luxemburg	2	61	31
	Germany, Federal Republic of	24	1,083	45
	Switzerland	2	-	-
	United Kingdom	18	497	28
	United States of America	2	21	11
	U.S.S.R.	2	36	18
6.	Drilling including counter-sinking machines Radial drilling machines	247	581	2
	Czechoslovakia	10	17	2
	Germany (East)	17	36	2
	Germany, Federal Republic of	1	18	18
	Italy	36	82	2
	Japan	14	28	2
	Poland	7	22	3
	Sweden	62	50	1
	United Kingdom	72	254	4
	United States of America	12	41	3
	U.S.S.R.	8	16	2
	Other countries	8	17	2

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 U.S. $
7.	Other drilling machine	950	837	1
	Germany (East)	26	14	1
	Germany, Federal Republic of	66	99	2
	Japan	255	22	0
	Sweden	255	89	0
	United Kingdom	162	448	3
	United States of America	80	134	2
	Other countries	106	31	0
8.	Centre type cylindrical grinding machines	69	497	7
	Czechoslovakia	2	12	6
	Germany, Federal Republic of	15	93	6
	Italy	25	16	1
	Japan	4	37	9
	Netherlands	1	18	18
	Sweden	1	22	22
	United Kingdom	21	299	14
	United States of America	-	-	-
9.	Centreless grinding machines	21	197	9
	Germany, Federal Republic of	2	32	16
	Italy	9	20	2
	Japan	2	17	8
	United Kingdom	5	70	14
	United States of America	3	58	19
10.	Internal grinding machines	19	295	16
	Germany Federal Republic of	1	9	9
	Japan	4	12	3
	Switzerland	2	16	8
	United Kingdom	12	258	21

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
11.	Surface grinding machines	561	833	1
	Czechoslovakia	12	29	2
	Germany (East)	6	13	2
	Germany, Federal Republic of	34	113	3
	Italy	18	46	3
	Japan	5	18	4
	Spain	6	16	3
	United Kingdom	447	304	1
	United States of America	21	271	13
	Other countries	12	23	2
12.	Tool and cutter grinding machines	590	543	1
	Germany, Federal Republic of	125	97	1
	Japan	135	46	–
	Netherlands	12	63	5
	Sweden	19	12	1
	Switzerland	10	32	3
	United Kingdom	73	157	2
	United States of America	166	82	1
	U.S.S.R.	17	31	2
	Other countries	33	23	1
13.	Power operated machines n.e.i.	1,826	1,416	1
	Czechoslovakia	7	20	3
	Germany, Federal Republic of	94	337	4
	Italy	35	31	1
	Japan	157	83	1
	Netherland	4	21	5
	Sweden	11	46	4
	Switzerland	22	88	4
	United Kingdom	1,336	609	1
	United States of America	148	160	1
	Other countries	12	21	2

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
14.	(a) Single spindle lathes	123	1,216	10
	Czechoslovakia	2	10	5
	France	5	65	13
	Germany, Federal Republic of	52	384	7
	Japan	6	27	5
	Switzerland	24	272	11
	United Kingdom	34	458	13
	(b) Multi-spindle lathes	30	863	29
	France	1	42	42
	Germany, Federal Republic of	1	19	19
	Italy	2	37	19
	Switzerland	3	19	6
	United Kingdom	22	729	33
	United States of America	1	17	17
15.	Capstan lathes	114	739	6
	Czechoslovakia	9	33	4
	Japan	4	22	6
	United Kingdom	96	674	7
	Other countries	5	10	2
16.	Roll turning lathes	2	321	161
	Germany, Federal Republic of	1	313	313
	United Kingdom	1	8	8
17.	Turret lathes	65	783	12
	Germany, Federal Republic of	8	69	9
	Italy	2	23	12
	Japan	7	40	6
	Switzerland	2	37	18
	United Kingdom	42	421	10
	United States of America	4	193	48

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
18.	Chucking machines, when not sliding, surfacing or screw-cutting lathes	38	792	21
	France	1	52	52
	Germany, Federal Republic of	16	219	14
	Italy	1	21	21
	Japan	1	6	6
	United Kingdom	18	480	27
	United States of America	1	14	14
19.	Other lathes	1,056	3,143	3
	Bulgaria	13	29	2
	China (Mainland)	46	63	1
	Czechoslovakia	14	51	4
	France	3	17	6
	Germany (East)	8	56	7
	Germany, Federal Republic of	72	669	9
	Italy	26	113	4
	Japan	202	511	3
	Poland	11	27	2
	Switzerland	9	19	2
	United Kingdom	382	1,262	3
	United States of America	70	134	2
	U.S.S.R.	67	131	2
	Other countries	133	61	1
20.	Combined milling, shaping, drilling and turning machines	30	279	9
	Germany	4	57	14
	Italy	5	18	4
	Japan	3	50	17
	United Kingdom	5	150	30
	Other countries	13	4	-

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
21.	Milling machines, n.e.i.	1,112	4,998	4
	Belgium-Luxemburg	1	14	14
	Czechoslovakia	10	40	4
	France	79	354	4
	Germany (East)	3	88	29
	Germany, Federal Republic of	243	613	3
	Italy	157	686	4
	Japan	48	743	15
	Netherlands	1	12	12
	Poland	10	51	5
	Spain	10	36	4
	Sweden	8	42	5
	Switzerland	17	152	9
	United Kingdom	315	1,048	3
	United States of America	178	1,040	6
	U.S.S.R.	16	77	5
	Other countries	16	2	-
22.	Hobbing machines	16	123	8
	Germany, Federal Republic of	5	60	12
	Switzerland	4	14	4
	United Kingdom	5	46	9
	Other countries	2	3	2
23.	Broaching machines	16	286	18
	Germany, Federal Republic of	6	134	22
	United Kingdom	6	143	24
	Other countries	4	9	2
24.	Planing and shaping machines, combined	1	39	39
	United Kingdom	1	39	39

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
25.	Gear shaping machines	23	239	10
	Germany, Federal Republic of	1	71	71
	United Kingdom	7	110	16
	United States of America	4	47	12
	Other countries	11	11	1
26.	Other	139	207	1
	Japan	9	16	2
	Sweden	34	48	1
	United Kingdom	39	91	2
	U.S.S.R.	22	31	1
	Other countries	35	21	1
27.	Slotting machines	26	80	3
	Germany, Federal Republic of	9	49	5
	Other countries	17	31	2
28.	Sawing and Filing machines	4,424	685	-
	Germany, Federal Republic of	250	364	1
	Italy	142	54	-
	Japan	21	24	1
	Sweden	100	24	-
	United Kingdom	56	70	1
	United States of America	64	128	2
	Other countries	3,791	21	-
29.	Screwing, chasing or tapping machines	281	432	2
	Belgium-Luxemburg	4	42	11
	Germany, Federal Republic of	44	117	3
	Japan	34	27	1

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
	Sweden	18	13	1
	United Kingdom	32	83	3
	United States of America	126	147	1
	Other countries	23	3	-
30.	Shears (billet, block slab, shears for rolled steel joists)	14	123	9
	Germany, Federal Republic of	3	103	34
	Other countries	11	20	2
31.	Guillotine shears			
	(a) Hydraulic	18	315	18
	Germany, Federal Republic of	1	131	131
	United Kingdom	16	172	11
	United States of America	1	12	12
	(b) Mechanical	906	72	-
	United Kingdom	438	47	-
	United States of America	107	17	-
	Other countries	361	8	-
32.	Other Guillotine shears	973	1,827	2
	Canada	3	215	72
	France	1	68	68
	Germany, Federal Republic of	574	393	1
	Italy	97	169	2
	Japan	31	24	1
	Switzerland	8	13	2
	United Kingdom	92	135	1
	United States of America	156	797	5
	Other countries	11	13	1

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
33.	Embossing or cutting machines for preparing plates for use in addressing machines	268	87	-
	Germany, Federal Republic of	29	20	1
	Italy	1	1	1
	United Kingdom	40	28	1
	United States of America	198	38	-
34.	Plate straightening machines	11	38	3
	Germany, Federal Republic of	5	14	3
	United Kingdom	3	16	5
	Other countries	3	8	3
35.	Metalworking presses (Hydraulic)	73	424	6
	Germany, Federal Republic of	8	42	5
	Japan	9	129	14
	Switzerland	2	49	25
	United Kingdom	43	190	4
	United States of America	3	11	4
	Other countries	8	3	-
36.	Mechanical presses	131	804	6
	Canada	1	19	19
	France	1	38	38
	Germany, Federal Republic of	22	153	7
	Japan	14	14	1
	Switzerland	4	23	6
	United Kingdom	75	464	6
	United States of America	8	82	10
	Other countries	6	11	2

Appendix 2 (continued)

Sl. No.	Type of Machine	No. of units	Value in ('000 US $)	Average value per unit in '000 US $
37.	Other presses	1,412	3,822	3
	France	2	73	37
	Germany, Federal Republic of	167	1,179	7
	Italy	24	18	1
	Japan	531	69	-
	Netherlands	7	23	3
	New Zealand	11	4	-
	Sweden	14	23	2
	Switzerland	14	89	6
	United Kingdom	309	1,142	4
	United States of America	333	1,202	4
38.	Metalworking machines n.e.f.	831	2,006	2
	France	13	208	16
	Germany, Federal Republic of	175	670	4
	Japan	179	94	1
	Sweden	3	24	8
	Switzerland	4	29	7
	United Kingdom	59	184	3
	United States of America	394	793	2
	Other countries	4	4	1
	GRAND TOTAL :	16,576	33,999	2

Source : Department of Statistics, Canbera.

Appendix - 3

List of Trade Association & Chambers of Commerce in Australia.

1. The Adelaide Chamber of Commerce,
54-60, Surrie Street, ADELAIDS, S.A.

2. The Brisbane Chamber of Commerce,
125, Adelaide Street, BRISBANE, OLD.

3. Associated Chambers of Commerce of Australia,
London Circuit, CANBERRA, A.C.T.

4. The Tasmanian Chamber of Commerce,
138, Macquarie Street, ROBART, TAS.

5. The Associated Chamber of Manufacturers of Australia,
Industry House, CANBERRA, A.C.T. (fabr).

6. Chamber of Manufacturer of N.S.W.,
12 o'Connell Street, SYDNEY, N.S.W. (fabr).

7. Queensland Chamber of Manufacturers,
375, Wickham Terrace, BRISBANE, QLD. (fabr).

8. The Chamber of Manufacturers,
South Australian, 12, Pirie Street, ADELAIDE, S.A. (fabr).

9. Victorian Chamber of Manufacturers,
368-374, St. Kilda Road, MELBOURNE, VIC. (fabr).

10. The Melbourne Chamber of Commerce,
90, William Street, MELBOURNE, VIC.

11. The Perth Chamber of Commerce Inc.,
168, St. George Terrace, PERTH, W.A.

12. The Sydney Chamber of Commerce Inc.,
36, Grosvenor Street, SYDNEY, N.S.W.

13. Hardware & Tool Manufacturers Associations of Australia,
C/o. Chamber of Manufacturers
12, Pirie Street, Adelhide, S.A.

Appendix - 4

Technical Magazines

Machine Tool Background - Published in Australia

Magazine	Published by
1. MACHINE SHOP & METAL MANUFACTURE	Technical & Industrial Press Pty., Ltd. 35, Clarence Street, Sydney, N.S.W. 2000

Editor: Neil Stewart

Circulation: 4,033 (10 times annually)

Readership:

6%	Officers of Commonwealth & State Departments.
42%	Manufacturing Engineers
24%	General Engineers
18%	Fabricating & Structural Engineers
4½%	Engine Re-conditioners
5%	Major Plants

Statewise Distribution:

40%	N.S.W.
34%	Victoria
11%	South Australia
4%	West Australia
1.6%	Tasmania
0.3%	Northern Territory
6%	New Guinea

Magazine	Published by
2. AUSTRALIAN MACHINERY & PRODUCTION ENGINEERING	Australian Trade Publications Pty., Ltd., 28, Chippen Street, Chippendale, N.S.W. 2008

Managing Editor: R.J. Findlay

Circulation: 3,800 Monthly.

Official Journal of Institute of Machine Tool Makers, Australia.

Distributed to Manufacturers and Production Engineers.

3. AUSTRALASIAN MANUFACTURER

Australasian Manufacturer
Publishing Co. Pvt. Ltd,
Elizabeth Street,
North Sydney, N.S.W.

Circulation:	10,101 Weekly
Readership Analysis:	42% Top Management 39% Technical Staff Design Engineers and Draughtsmen 19% Marketing & Sales, Purchasing Officers.
Statewise Distribution:	38% N.S.W. 34% Victoria 10% South Australia 5% Western Australia 3% Tasmania

4. ENGINEERING AUSTRALIA

Engineering Australia
390, Burwood Road,
Hawthorn, Victoria, 3122.

Editor:	J. Emmett
Circulation:	6,000 monthly
Readership Analysis:	51% Top Management 38% Plant & Production Engineers 11% Works Managers.
Statewise Distribution:	47% Victoria 38% N.S.W. 9½% South Australia 1½% Queensland 3% Western Australia 1% Tasmania.

5. TENIERS

Tait Publishing Co.
Pvt. Ltd.,
415, Boruke Street,
Melbourne,
Victoria
Australia.

Appendix - 5

Source of Reference : Australia

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS (Canberra, A.C.T.)

Overseas Trade
(Annual; PC:A$ 5.15; English)

Trade, commodity by country; national classification, 5 digit; yearly (July-June) figures; also, numerous summary tables; values in Australian dollars.

Monthly Bulletin of Overseas Trade Statistics
(Monthly, in two volumes; PC 48s 5d; English)

Total trade (Vol I - Exports, Vol II - Imports), by country, by economic classes and by commodities; national classification based on the SITC, 5 digit; figures for the current month, and cumulative for the year; comparative data for the preceding year; values previously in Australian Pounds, now in Australian dollars.

Preliminary Monthly Statement of Australian Overseas Trade - New Series
(Monthly; English)

Total trade by month, showing monthly data for preceding fiscal year; values in Australian dollars.

General Statistics

Official Year Book of the Commonwealth of Australia
(Annual; PC: 27s 8d; English)

Quarterly Summary of Australian Statistics
(Quarterly; PS: A$ 2.40; English)

See also: BOARD OF TRADE (UK)
COMMONWEALTH ECONOMIC COMMITTEE (UK)
STATISTISCHES BUNDESAMT-WIESBADEN (GERMANY, F.R.)
UNITED NATIONS ORGANISATION
UN ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST

Appendix - 6

List of Interviews Made by Survey Team
Australia

Dates of Visit : 27.6.1968 to 9.7.1968

		IIMC	DCo
Team Members	:	Mr R.C. Jain	Dr R. Singh

Name of Firm/Organisation	Persons Interviewed	Designation
A. Manufacturers		
McPherson's Limited 392 Macaulay Road Kengington Victoria	Mr G.H. Montgomery	Manager - Machine Tool Works
Simpson Pope Limited Simpson Avenue Dudley Park S. Australia	Mr Max Knapman	Engineering Manager
B. Distributors		
Scruttons Pty Ltd 039, Gardener's Road Mascot, N.S.W.	Mr K.B. Boxhall	General Manager
	Mr Smith	Manager - Machine Tools Department
Blyth, Greene, Jourdain (Australia) Pty Ltd Machine Tool Division 457, Somerville Road W. Footscray 3012 Melbourne	Mr Derek W. Hammond	Sales Manager - Machine Tool Division
Snyder Machinery Pty Ltd Melbourne	Mr John Pring	Director

Appendix 6 (cont'd)

Name of Firm/Organisation	Persons Interviewed	Designation
Wickman (Australia) Pty Limited 153, Victoria Parade Collingwood Victoria	Mr W. Woods	Sales Director
Austin Quinn (Vic) Pty Limited Machine Tool Merchants 212-220 Rosslyn Street W. Melbourne	Mr R.A. Patey	Manager
Japan Machines (Aus) Pty Limited 487 Swan Street Burnley Victoria	Mr Laurie Mitchell	Manager
Specialised Machine Tool Pty Limited 644 Burnwood Street Hawthorn Melbourne	Mr L.G. Skoutarides	Manager
Naylor Gibbon Battle Pty Limited N.S.W.	Mr Gibson	Manager - Machine Tool Department

C. Users

Vickers Ruwolt Pty Ltd 524, Victoria Street Richmond / Victoria	Mr Benson	Chief of Trading
	Mr W.M. Dyson	
Kelvinator Australia Limited Anzac Highway S. Australia	Mr Bill Jolly	Chief Engineer
University of Adelaide Adelaide	Prof H.H. Davis	
	Mr Fitton	Workshop Manager

Appendix 6 (cont'd)

Name of Firm/Organisation	Persons Interviewed	Designation
D. Government Officials/Associations		
Industries Assistance Branch S.A. Premier's Dept State Bank Building 51 Pirie Street Adelaide	Mr Hal. S. Dean	
Melbourne Chamber of Commerce Industry House Melbourne		Secretary
E. Others		
Sydney Technical College Sydney	Mr J. Giles	Head Teacher
Education Department S. Australia	Mr M.H. Bone	Director of Tech Education
Department of Education (Technical Inspector's Branch) Treasury Building 3rd Floor Spring Street Melbourne	Mr Harry Slinger	
K.A.B. Projects Pty Limited 1, Rawhiti Street Roseville N.S.W. 2069	Mr K.A. Bisley	Director

Appendix - 7

Sectorial Employment

Period	Primary(2) Industry	Seasonal Manufacturing(3)	Food,(4) Drink & Tobacco	Textiles, Clothing and Leather	Building Materials and Furnishings	Engineering & Metal Working	Miscellaneous Manufacturing	Power, Water and Sanitary Services	Building and construction	Transport and Communication(5)	Commerce(6)	Domestic and Personal Services	Administration and professional	Total
							Males							
Average for year ended -														
1960	10,737	23,241	9,248	12,646	25,873	55,231	21,923	11,828	53,276	54,912	71,853	11,513	51,204	413,485
1965	10,911	26,188	10,183	14,143	29,123	71,575	27,824	13,089	58,616	59,023	83,131	12,756	60,560	477,122
1966	10,948	26,527	10,476	14,461	30,011	75,490	29,587	13,112	61,638	59,707	85,342	13,117	62,226	492,642
1967	10,889	28,074	10,828	14,648	30,525	78,651	30,611	13,427	62,587	60,331	86,891	13,540	64,141	505,143
Average for year ended -							Females							
1960	285	2,134	5,022	23,677	1,797	5,648	7,884	831	1,292	9,204	39,371	14,010	49,447	160,602
1965	312	2,778	5,314	27,006	2,098	9,557	10,023	913	1,662	11,616	47,678	16,506	59,751	195,214
1966	352	2,881	5,594	27,786	2,324	10,320	10,853	933	1,877	12,440	50,013	17,170	63,773	206,316
1967	378	3,084	5,753	28,008	3,321	10,924	11,494	1,007	2,021	13,451	51,746	17,588	68,766	216,521
Working Proprietors - Working proprietors, Vacancies(7), and Number of units at 15 October 1967														
Males	513	122	849	1,009	1,901	5,964	1,176	24	8,263	2,680	14,346	4,747	800	42,394
Females	15	11	426	436	123	483	208	5	-	276	6,506	3,607	289	12,385
Vacancies(7)														
Males	104	-	34	63	209	888	220	294	466	602	788	219	1,179	5,066
Females	7	-	53	566	17	65	99	11	1	98	711	350	958	2,946
No. of unit(1)	628	441	1,071	1,605	2,483	6,616	1,654	298	7,733	3,079	20,704	6,594	4,766	57,272

Source: Department of Labour.

(1) This table covers only units in which at least two persons (including working proprietors) are engaged. Figures headed "Males and Females" relate to full time employees only and do not include working proprietors; the latter are shown separately in the lower portion of the table.
(2) Excluding farming, fishing, hunting and trapping.
(3) Comprising meat processing, fruit and vegetable preserving and diary factories.
(4) Excluding meat processing, fruit and vegetable preserving and diary factories.
(5) Excluding loading and unloading of ships.
(6) Including wool stores.
(7) Total vacancies recorded in half yearly survey.

Extracted from Monthly Abstract of Statistics, April 1968, Department of Statistics, Wellington, New Zealand, Table - 15.

Appendix - 8

Index of Production - Annual Statistics

Year	Index of Production			
	Farm		Factory	All Groups
	Value	Volume		
	1938-39 =	100	1954-55 = 100	1954-55 = 100
1955-56	397	139	105	104
1956-57	440	141	107	106
1957-58	425	151	114	112
1958-59	404	157	120	115
1959-60	447	159	124	119
1960-61	440	166	137	127
1961-62	426	169	144	131
1962-63	469	178	150	135
1963-64	547	184	166	143
1964-65	567	189	187	152
1965-66	610(1)	200(1)	200	161

Source: Extracts from Monthly Abstract of Statistics April 1968, Department of Statistics, Wellington, New Zealand

(1) Provisional

Number of Household Appliances Produced

Year		Refrigerators, etc.				Washing Machines			Tumbler Clothes Dryers	Electric Ranges	Electric Rangettes
		Under 4 cu.ft.	4 cu.ft. and over	Deep Freeze, Display Cabinets etc.	Total	Wringer Type	Spin Drier Type	Total			
1957	..	9,854	48,947	3,842	62,643	32,698	1,662	34,360	-	28,761	4,759
1960	..	3,258	49,942	6,487	59,687	30,913	14,427	45,340	4,015	37,986	3,267
1965	..	2,720	44,432	14,955	62,107	25,150	22,405	47,555	6,649	50,895	4,644
1966	..	2,172	52,811	19,849	74,832	26,916	23,992	50,908	6,820	53,984	5,174
1967	..	1,201	40,643	32,420	74,264	25,027	20,876	45,903	4,824	44,424	2,977

Source: Department of Industries and Commerce.

Household Appliances - continued

Year		Lawn Mowers				Radios				Television Sets	Gramaphone Records			
		Hand	Motor		Total	Radiograms	Car Radios	Other Radios	Total		78 r.p.m.	45 r.p.m.	33.1/3 r.p.m.	Total
			Cylinder	Rotary										
1957	..	13,920	5,498	44,591	64,009	30,108	21,411	50,094	101,613	-	1,599	503	292	2,394
1960	..	10,812	10,557	39,078	60,447	21,400	10,699	115,736	147,835	8,138	-	1,941	1,029	2,970
1965	..	8,119	9,397	58,764	76,280	13,762	22,827	60,059	96,648	143,989	-	1,521	1,282	2,803
1966	..	9,077	11,588	60,268	80,933	21,453	20,562	40,082	82,097	90,109	-	1,834	1,460	3,293
1967	..	8,411	11,239	50,317	69,967	13,196	19,194	47,135	79,525	53,945	-	1,833	1,483	3,316

Source: New Zealand Radio and Television Manufacturer's Federation.

Extract from Monthly Abstract of Statistics, April1968,
Department of Statistics, Wellington, New Zealand (Table No.32)

Appendix - 10

Factory Production - Statistics by Industry Group 1965-66

Industry Group	Persons Engaged No.	Salaries & Wages Paid '000 US $	Cost of Materials '000 US $	Other Expenses '000 US $	Total Costs '000 US $	Value of Output '000 US $	Added Value '000 US $
Food	36,250	225,606	1,496,802	141,483	1,863,891	1,977,128	480,926
Beverages	2,520	15,329	45,888	16,246	80,227	109,176	60,527
Tobacco manufacturers ..	1,134	5,498	36,358	4,051	45,904	55,528	19,170
Textiles	13,404	67,983	245,030	39,619	352,641	375,285	130,254
Footwear, other wearing apparel, made up textiles ..	28,073	105,429	184,675	61,961	321,085	350,884	166,209
Wood and cork products(except furniture)..	14,756	88,368	201,805	49,933	340,106	383,144	181,339
Furniture and fittings ..	5,850	33,511	58,986	10,748	103,241	114,392	55,327
Paper and paper products ..	7,485	50,107	144,642	73,434	268,183	317,120	172,478
Printing and publishing etc. ..	13,846	81,738	79,200	40,232	201,173	238,174	158,974
Leather and leather products (except footwear and apparel) ..	1,924	9,903	24,351	3,999	38,252	42,707	18,353
Rubber products	3,578	23,324	41,097	14,735	79,156	96,023	54,926
Chemicals and chemical products ..	6,516	38,216	189,610	36,187	264,013	309,846	120,236
Petroleum and coal products ..	704	5,299	130,740	14,037	150,076	172,950	42,210
Non-metallic mineral products n.e.i. ..	8,958	55,401	69,896	55,780	181,077	214,472	144,576
Basic metal manufactures ..	1,406	9,165	29,824	5,236	44,225	49,643	19,816
Metal products except machinery and transport equipment ..	14,275	90,928	177,390	47,075	315,391	361,000	183,634
Machinery (except electrical) ..	15,577	96,175	161,330	38,004	295,511	332,062	170,732
Electrical machinery and appliances ..	9,252	48,522	126,734	23,917	199,173	223,129	96,396
Transport equipment ..	30,289	168,313	403,745	60,466	632,524	690,146	286,398
Miscellaneous products ..	7,054	37,744	60,529	21,269	119,545	143,708	83,179
Total ..	222,851	1,256,565	3,911,397	727,432	5,895,394	6,557,035	2,645,639

Source: Department of Statistics.

Abstract from the Reserve Bank of New Zealand Bulletin: May 1968.

Appendix - 11

Factory Production - Principal Statistics[1]

(in 000 US $)

Year[2]	Number of Establishments	Persons engaged (000)	Salaries & wages paid	Cost of Material	Other Expenses	Value of output	Value added	Value of land, building, machinery and plants
1955-56	8,513	158.2	593665	2116367	310976	3222681	1106314	927152
1956-57	8,488	156.8	614652	2188234	331857	3335307	1147074	997881
1957-58	8,529	163.0	664739	2315266	365928	3572907	1257641	1048650
1958-59	8,565	168.7	708095	2310931	388172	3640192	1329255	1136491
1959-60	8,550	172.0	754415	2432548	403539	3909118	1476571	1353018
1960-61	8,745	181.3	834186	2702155	437649	4192672	1590518	1481150
1961-62	8,981	187.6	894887	2806235	480844	4468054	1763482	1554192
1962-63	9,034	191.5	1041396	5278961	527081	4657046	1971085	1758174
1963-64	9,365	199.3	1113606	3191975	567699	5291231	2099262	1853286
1964-65	9,753	211.1	1141218	3722814	642590	6053021	2330207	2070015
1965-66	9,945	229.9	1351333	3895108	724402	6529729	2734621	2347235

Source: Dept. of Statistics, Wellington.

Note:
1. New Series - factories classified according to U.N. Standard Industrial Classification. Logging operations of sawmillers, generation and supply elctricity eliminated.
2. In general year ended 31st March, but some returns cover financial years ending at other dates during the year.

Appendix - 12

Number of Machines for Replacement by Type

Type of machine	Number existing in 1967	Number of machines for replacement 1963	Replacement demand 1967	Additional demand addition during 1963 - 67	Machines sold on 1963-67
METAL CUTTING MACHINE					
Boring Machine	113	16	15	20	35
Broaching Machines	24	-	2	24	26
Cut off Sawing & Filling Machines	502	-	73	502	575
Drilling Machines	1457	151	180	370	550
Gear Cutting and Finishing Machines	42	7	7	11	18
Grinding Machines	1207	103	104	223	327
Honing & Lapping Machines	54	-	1	54	55
Milling Machines	391	41	51	144	195
Planers	27	5	10	7	3
Polishing & Buffing Machines	388	-	25	388	413
Shapers	196	19	26	56	82
Threading	285	-	36	285	321
Turning Machines	1526	-	271	1526	1797
Other Metal Cutting Machines	121	-	6	121	127
Total:	6333	342	807	3717	4524

Appendix 12 (cont'd)

Type of Machine	Number existing in 1967	Number of machines for replacement 1963	Replacement demand 1967	Additional demand addition during 1963 - 67	Machines sold on 1963-67
METAL FORMING MACHINES					
Metal Forming Presses	618	-	51	618	669
Hydraulic Presses	226	-	10	226	236
Pneumatic Presses	78	-	2	78	80
Mechanical Presses	850	-	79	850	929
Punching & Shearing	389	-	28	389	417
Forging Machinery	80	-	1	80	81
Elect. & Weld. Equip. Equipt.	1960	-	182	1960	2142
Heating Equipments	132	-	4	132	136
Die Casting Machines	28	-	7	28	35
Rivetting Machines	98	-	1	98	99
Total:	4459	-	365	4459	4824
GRAND TOTAL:	10792	342	1172	8176	9348

Source: Survey of Metal Working Equipments in New Zealand 1963 and 1967 undertaken by Manufacturing Engineers Federation, Wellington.

Census of Machine Tools Installed in New Zealand

	1967 Survey							1963 Survey (For Comparison)				
	Number of Machines, By Age					Total No.of Machines	No.Stated to need early Re-placement	Number of Machines, By Age			Total No.of Machines	No.Stated to need early Re-placement
	Under 5 Yrs %	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %			Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %		
Category 1												
Metal Cutting Machines												
Boring Machines												
Jig	40	20	20	-	20			40	20	40		
Fine	20	27	6	27	20			69	23	8		
Horizontal	38	2	24	13	23			6	50	44		
Vertical	27	16	41	5	11			32	48	20		
Others	27	18	27	10	18			18	35	47		
Total	31	12	28	11	18	113	15	26	41	33	93	16
Broaching Machines	54	8	8	13	17	24	2	21	36	43		
Cut-off, Sawing, and Filing Machines												
Filing	23	23	19	12	23			31	46	23		
Hacksaw	16	17	21	16	30			21	37	42		
Bandsaw	36	27	7	9	21			34	38	28		
Cut-off	24	39	22	10	5			34	50	16		
Abrasive	19	34	38	3	6							
Power Saw	43	13	7	13	24							
Circular Saw	35	29	19	10	7							
Others	37	28	15	7	13							
Total	28	25	17	11	19	503	73					

Appendix 13 (cont'd)

	1967 Survey							1963 Survey(For Comparison)				
	Number of Machines, By Age							Number of Machines, By Age				
	Under 5 Yrs %	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %	Total No. of Machines	No. Stated to need early Replacement	Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %	Total No. of Machines	No. Stated to need early Replacement
Drilling Machines												
Radial	29	15	15	9	32			24	37	39		
Single-Spindle	20	21	17	16	26			19	39	42		
Multi-Spindle	15	17	13	14	41			32	31	37		
Bench	9	11	34	37	9			13	65	22		
Others	37	16	17	8	22							
Total	21	20	17	15	27	1457	180	20	40	40	1087	151
Gear Cutting & Finishing Machines												
Gear Hobbers	10	10	14	33	33			7	22	71		
Gear Shapers & Planers	36	-	7	22	35			38	31	31		
Bevel Gear Cutters	-	-	14	14	72			-	17	83		
Total	17	5	12	26	40	42	7	18	24	58	33	7
Grinding Machines												
External Cylindrical	26	11	10	17	36			21	29	50		
Internal Cylindrical	22	11	11	6	50			12	29	59		
Centreless	30	20	30	10	10			47	24	29		
Surface	31	23	14	15	17			21	36	43		
Tool & Cutter	31	20	20	16	13			16	50	34		
Bench	24	24	21	15	16			22	48	30		
Others	48	15	10	5	22							
Total	28	21	18	14	19	1207	104	21	45	34	984	103

Appendix 13 (cont'd)

	1967 Survey							1963 Survey(For Comparison)				
	Number of Machines, By Age							Number of Machines,By Age				
	Under 5 Yrs %	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %	Total No.of Machines	No.Stated to need early Replacement	Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %	Total No. of Machines	No.Stated to need early Replacement
Honing & Lapping Machines												
Vertical Honer	8	-	42	17	33			29	50	21		
Diamond Tool Lap	-	38	12	38	12							
Pedestal	63	37	-	-	-							
Other	13	17	26	31	13							
TOTAL	20	20	22	22	16	54	1	29	50	21		
Milling Machines												
Plain Horizontal	19	6	11	17	47			9	26	65		
Universal	35	20	11	12	22			22	34	44		
Vertical	41	8	8	16	27			-	-	-		
Tracer Die Mills	37	16	16	5	26			-	-	-		
Specialised Production	29	-	24	47	-							
Other	44	22	6	-	28							
TOTAL	31	12	11	15	31	391	51	19	30	51	247	41
Planers	19	4	-	7	70	27	10	6	11	83	34	5
Polishing & Buffing Machines												
Polishing Stands	18	12	19	17	54			13	42	45		
Abrasive Belts, Discs	22	23	25	12	18			43	41	16		
Belt Grinders	38	38	12	-	12			19	40	41		
Other	25	29	27	15	4							
TOTAL	21	19	21	14	25	388	25					

Appendix 13 (cont'd)

	1967 Survey							1963 Survey(For Comparison)				
	Number of Machines, By Age					Total No.of Machines	No.Stated to need early Replacement	Number of Machines,By Age			Total No.of Machines	No.Stated to need early Replacement
	Under 5 Yrs	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %			Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %		
Shapers												
Horizontal	15	17	17	16	35			14	33	53		
Slotters	33	2	4	7	54			-	-	-		
Other	22	-	22	22	34			6	-	94		
TOTAL	18	13	15	15	39	196	26	13	30	57	140	19
Threading												
Tapping	38	9	13	16	24			23	47	30		
Hobbing & Milling	11	-	56	33	-			-	100	30		
Screwing	23	21	15	11	29			15	44	41		
Thread Bolling	19	15	4	31	31			38	39	23		
Other	20	80	-	-	-			-	-	-		
TOTAL	29	17	14	15	25	285	36					
Turning Machines												
Centre Lathes	24	15	15	16	30			16	43	41		
Capstan Lathes	16	19	14	20	31			20	40	40		
Toolroom Lathes	36	17	22	11	14			27	39	34		
Automatic Single-Spindle	16	11	25	8	40			32	41	27		
Automatic Multi-Spindle	11	9	3	63	14			11	78	11		
Spinning	37	21	8	17	17			8	-	-		
Auto Chuckers	26	23	22	-	29			-	-	-		
Other	24	19	19	25	13			-	-	-		
TOTAL	22	15	14	22	27	1526	271	17	42	41		
Other Metal Cutting Machines Not Listed Above												
Guillotine	25	18	18	25	14			-	-	-		
Profile	23	15	39	15	8			-	-	-		
Slotting	-	-	50	50	-			28	43	29		
Other	25	27	17	14	17			-	-	-		
TOTAL	23	22	22	19	14	121	6	-	-	-		
Total Number of Metal Cutting Machines	1536	1149	1052	1026	1570	6333	734					
Percentages	24	18	17	16	25	(100%)	(12%)					

Appendix 13 (Cont'd)

	1967 Survey							1963 Survey (For Comparison)				
	Number of Machines, By Age							Number of Machines,By Age				
	Under 5 Yrs %	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %	Total No.of Machines	No.Stated to need early Replacement	Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %	Total No.of Machines	No.Stated to need early Replacement
Category 3												
Metal Forming												
Press Brakes	36	30	14	6	14			25	49	26		
Bending & Forming Machines	19	18	17	12	34			15	32	53		
Bending machines, pipe, bar and shapes	30	32	13	11	14			33	51	16		
Bending Rolls	16	16	22	11	35			11	39	50		
Wire & Strip Forming	21	16	18	18	27			22	38	39		
Total	22	21	17	11	27	618	51					
Hydraulic Presses												
Vertical	34	16	16	16	18			30	36	34		
Horizontal	30	20	40	-	10			19	44	37		
Extrusion	17	50	-	-	33			-	-	100		
Plastic Moulding	14	14	14	42	16			-	-	-		
Other	29	21	-	14	36			-	-	-		
Total	29	18	14	19	20	226	10					
Pneumatic Presses	52	17	17	9	5	78	2	58	21	21		
Mechanical Presses												
Open Front	15	16	15	17	37			20	34	46		
Straight Sided	21	17	11	16	35			15	22	63		
Friction Screw	13	13	17	7	50			-	-	-		
Other	19	2	11	30	38			-	-	-		
Total	16	15	14	17	38	850	79					

Appendix 13 (Cont'd)

	1967 Survey							1963 Survey (For Comparison)				
	Number of Machines, By Age					Total No.of Machines	No.Stated to need early Replacement	Number of Machines,By Age			Total No.of Machines	No.Stated to need early Replacement
	Under 5 Yrs %	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %			Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %		
Category 2												
Punching & Shearing Machines												
Punching machines (including turret)	10	44	13	3	25			-	-	-		
Plate & Sheet Shears	20	17	18	9	36			14	42	44		
Bar & Angle Shears	27	18	19	9	27			25	41	34		
Rotary Shears including Slitters	9	28	9	19	35			6	52	42		
Nibbling Machines	26	29	28	10	7			31	46	23		
Blanking Press	15	8	54	-	23			-	-	-		
Other	100	-	-	-	-			-	-	-		
Total	21	22	20	9	28	389	28					
Forging Machinery (except Presses)	13	23	11	21	32	80						
Electrical Welding Equipment												
Flame Cutter	32	33	18	12	5			28	55	17		
Elect. CO2	26	32	30	6	6			-	-	-		
Arc. Welder	27	29	27	9	8			29	45	26		
Gas Welder	34	36	22	5	3			28	47	25		
Butt Welder	11	16	30	30	13			-	-	-		
Spot Welder	21	26	10	22	21			-	-	-		
Resistance	32	39	11	4	14			37	34	29		
Creeper Cutter	64	30	3	-	3			-	-	-		
Other	34	34	20	4	8			-	-	-		
Total	30	32	21	8	9	1960	182					
Heating Equipment, Excluding Foundry												
Baking & Drying Ovens	37	23	17	10	13			38	39	23		
Other	44	6	17	33	-			-	-	-		
Total	38	20	17	13	12	132	4	38	39	23		

	1967 Survey							1963 Survey (For Comparison)				
	Number of Machines, By Age					Total No. of Machines	No. Stated to need early Replacement	Number of Machines, By Age			Total No. of Machines	No. Stated to need early Replacement
	Under 5 Yrs %	5 Yrs & Under 10 Yrs %	10 Yrs & Under 15 Yrs %	15 Yrs & Under 20 Yrs %	20 Yrs & Over %			Under 5 Yrs %	5 Yrs & Under 15 Yrs %	15 Yrs & Over %		
Category 1												
Diecasting Machines												
Hot Chamber	19	19	19	19	24			31	49	20		
Cold Chamber	14	14	-	14	58							
Total	18	18	14	18	32	28	7	31	49	20		
Rivetting Machines												
Pneumatic	55	27	-	14	4			32	19	49		
Spin Rivetters	69	8	-	8	15			-	-	-		
Other	25	39	10	12	14							
Total	43	29	5	12	11	98	1	32	19	49		
Total Number of Metal Forming Machines	1158	1117	800	504	880	4459	365					
Percentages	26	25	18	11	20	(100%)	(8%)					

Stock of Machine Tools by Types - Year Ended 1967

	Number of Machines By Age						
	Under 5 Years	5 Years & Under 10 Years	10 Years & Under 15 Years	15 Years & Under 20 Years	20 Years & Over	Total number of machines	Number estimated to need early replacement
GRAND TOTALS							
A) Numbers							
Metal Cutting	1,536	1,149	1,052	1,026	1,570	6,333	734
Metal Forming	1,158	1,117	800	504	880	4,459	365
	2,694	2,266	1,852	1,530	2,450	10,792	1,099
B) Percentages							
Metal Cutting	24	18	17	16	25	(100)	12
Metal Forming	26	25	18	11	20	(100)	8
	25	21	18	14	23	(100)	10

Source: Survey of Metal Working Equipment in New Zealand Undertaken by Wellington Manufacturing Engineers Federation.

Appendix - 14

Import of Metal Working Machinery into New Zealand by Country of Origin during the year ended June 1966

	Country of origin	Quantity (c.w.t.)	Value in US $		Average c.i.f. value in US $
			c. d. v.	c. i. f.	
1.	AUSTRALIA				
	Drilling Machines	96	35,859	38,068	397
	Lathes	864	189,968	162,486	188
	Grinding Machines	1315	329,931	307,936	234
	Milling Machines	12	2,203	2,203	184
	Other Machines	6790	712,549	700,409	103
		9077	1,270,510	1,211,102	133
2.	CANADA				
	Lathes	3	4,516	4,522	1507
	Other Machines	105	11,071	13,220	126
		108	15,587	17,742	164
3.	CZECHOSLOVAKIA				
	Drilling Machines	322	27,095	33,182	103
	Lathes	933	113,285	142,810	153
	Grinding Machines	280	26,484	32,020	114
	Other Machines	474	80,345	91,968	194
		2009	247,209	299,980	149
4.	GERMANY, WEST				
	Drilling Machines	94	15,368	16,640	177
	Lathes	832	272,820	275,524	331
	Grinding Machines	568	168,028	182,608	321
	Milling Machines	78	31,249	32,708	419
	Other Machines	2362	643,359	693,612	294
		3750	1,130,824	1,201,092	320
5.	INDIA				
	Lathes	96	30,808	17,323	180

Appendix 14 (cont'd)

	Country of origin	Quantity (c.w.t.)	Value in US $		Average c.i.f. value in US $
			c. d. v.	c. i. f.	
6.	**JAPAN**				
	Lathes	149	25,206	27,398	184
	Grinding Machines	162	18,662	22,094	115
	Milling Machines	42	4,874	5,310	126
	Other Machines	407	76,555	81,237	200
		760	125.297	136,039	179
7.	**ITALY**				
	Lathes	711	137,610	146,567	206
	Grinding Machines	431	70,683	75,999	176
	Milling Machines	845	153,172	162,255	192
	Other Machines	956	197,046	215,356	225
		2943	558,511	600,177	204
8.	**CHINA, MAINLAND**				
	Lathes	68	5,971	6,643	98
	Milling Machines	28	10,223	10,879	389
	Other Machines	30	5,739	6,791	226
		126	21,933	24,313	193
9.	**SWITZERLAND**				
	Drilling Machines	35	14,911	16,376	468
	Lathes	104	67,951	66,188	636
	Grinding Machines	14	13,109	8,422	602
	Milling Machines	43	33,281	43,307	1007
	Other Machines	31	28,572	31,838	1027
		227	157,824	166,131	732
10.	**SWEDEN**				
	Drilling Machines	757	114,128	121,802	161
	Grinding Machines	124	39,902	43,406	350
	Milling Machines	60	18,034	18,778	313
	Other Machines	552	102.599	110,889	201
		1493	274,663	294,875	198

Appendix 14 (cont'd)

	Country of origin	Quantity (c.w.t.)	Value in US $ c. d. v.	Value in US $ c. i. f.	Average c.i.f. value in US $
11.	SPAIN				
	Drilling Machines	35	4,296	4,786	137
	Lathes	430	46,171	51,393	120
	Grinding Machines	156	25,867	29,833	191
	Milling Machines	187	34,647	37,627	201
	Other Machines	122	17,819	19,725	162
		930	128,800	143,364	154
12.	USSR				
	Drilling Machines	79	5,574	6,059	77
	Lathes	468	60,206	65,439	140
	Other Machines	466	47,405	51,564	111
		1013	113,185	123,062	121
13.	UK				
	Drilling Machines	1487	245,790	259,329	174
	Lathes	7117	1,762,621	1,923,863	270
	Grinding Machines	1767	520,819	533,852	302
	Milling Machines	21	576,542	605,196	28818
	Other Machines	11904	2,410,817	2,568,671	216
		22296	5,516,589	5,890,911	264
14.	USA				
	Drilling Machines	74	17,836	21,334	288
	Lathes	61	24,214	26,748	439
	Grinding Machines	335	134,961	145,124	433
	Milling Machines	388	190,899	186,955	482
	Other Machines	2271	1,072,821	1,114,498	491
		3129	1,440,731	1,494,659	478
	GRAND TOTAL	47957	11,032,471	11,620,770	242

Appendix - 15

List of Trade Associations in New Zealand

1. Association Chambers of Commerce of New Zealand
   185, Willis Street, Wellington C.2

2. Auckland Chamber of Commerce
   2, Courthouse Lane
   Auckland.

3. Canterbury Chamber of Commerce
   159, Oxford Terrace
   Christchurch
   New Zealand.

4. Dunedin Chamber of Commerce
   2, Dowling Street
   Dunedin C.1.

5. Wellington Chamber of Commerce
   Commerce House
   126, Waksfield Street
   Wellington.

6. New Zealand Manufacturers Federation
   Corner of Courtenay Place and Allan Street
   Wellington C.3.

7. New Zealand Bureau of Importers
   Windsor House
   58-60, Queen Street
   Auckland C.1.

8. Export Trade Promotion Group
   Post Box 1605
   Wellington.

Appendix - 16

List of Important Distributors in New Zealand

1. Berry Engineering Works Ltd., Box 179 Palmerston North
2. Blain Reed and Co. Ltd, Box 941, Wellington
3. John Burne (Engineering) Ltd., Box 2380, Auckland
4. Clyde Engineering Ltd., Box 480, Lower Hutt, Wellington
5. Cory-Wright & Salmon Ltd., Box 1230, Wellington
6. Dalgoff & Kind (N.A.) Ltd., Box 3040, Wellington
7. B.B. Denninton & Co. Ltd., Box 135, Dunedin
8. Engineering Industries (N.Z) Ltd., Box 2205, Christchurch
9. R.R. Fisher & Co., Box 273, Auckland
10. Gordon and Gotch (N.Z.) Ltd., Box 1595, Wellington
11. H.C. Grossman Ltd., Box 2319, Auckland
12. Hampton & Co. (Da) Ltd., Box 815, Dunedin
13. Fisher & Blundell Ltd., Box 9110, Auckland
14. General Machinery Co., Box 293, Wanganui
15. MacEwans Machinery Ltd., Box 3048, Wellington

Appendix - 17

New Zealand: Source of Reference

DEPARTMENT OF STATISTICS (Government Printer, Wellington)

NEW ZEALAND - EXPORTS
(annual : PC : US $ 3 : English)

Exports by country, by SITC sections and divisions; detailed exports, commodity by country and country by commodity; SITC (7 digit); yearly (June year) figures; values in New Zealand pounds.

New Zealand - Imports. Parts A and B
(annual : PC : US $ 3 per volume : English)

Imports by country; detailed imports, commodity by country (Part A) and country by commodity (Part B); SITC (7 digit); yearly (June year) figures; values in New Zealand pounds.

New Zealand : External Trade Report and Analysis
(irregular : PC : $ 1.05; English)

Analytical and summary trade tables by commodities and countries several showing comparative figures for a series of years; SITC; yearly figures; (starting in 1962 : June years) values in New Zealand pounds.

General Statistics:

New Zealand Official Yearbook
(monthly: PS : £2.10s; English)

The monthly supplement gives trade statistics by SITC divisions and selected items; the quarterly supplement shows commodities in greater detail, by country; also, countries by commodities; national classification based on the SITC; values in pounds.

See also: BOARD OF TRADE (UK)
COMMONWEALTH ECONOMIC COMMITTE (UK)
STATISCHES BUNDESAMT-WIESBADEN (GERMANY, F.R.);
UNITED NATIONS ORGANISATION:
UN ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST

Appendix - 18

List of Interviews Made by Survey Team

NEW ZEALAND

Date of Visit : 1.7.1968 to 2.7.1968

Team Members:	IIMC	DCo
	Mr R.C. Jain	Dr R. Singh

Name of Firm/Organization	Persons Interviewed	Designation
(A) Distributors:		
1. Moyes & Groves Limited 768 Gt. South Road Penrose, Auckland	Mr V.R. Moyes	Director
2. Morris, Black & Matheson Ltd 403 High Street Lower Hutt	Mr H.C. Murphy	Branch Manager
3. Mangrovite Machinery Ltd Corner of Railway Avenue & Herbert Road Lower Hutt	Mr R.G. Hutt	Director
4. Cory Wright & Salmon Ltd 31-37, Panama Street P. Box - 1230 Wellington	1. Mr K.F. McLauchlan 2. Mr G.A. Anderson	Managing Director Manager
5. MaC Ewans Machinery Ltd P.O. Box 3048 109 Featherston Street Wellington	Mr A.B. Duncln	Director
6. Morris, Black & Matheson 9, Gore Street, Auckland	Mr H.L. Allen	Manager
(B) Users:		
1. Tonee Products Ltd Auckland	Mr James	Director

Name of Firm/Organization	Persons Interviewed	Designation
2. Manufacturing Engineers Federation Industry House (Nr. of Courtenay Place & Allen Street)	Mr Dowson	Secretary
3. Graham Engineering Co. Penrose Auckland	Mr R. Graham	Director
4. Refrigeration Engineering Company Limited Penrose, Auckland	Mr W.M. Davis	Production Incharge
5. Auto Engineering Co Ltd Auckland	1. Mr Oscar Sutter 2. Mr McWin	Works Manager Production Incharge
(C) Government Officials/ Association		
1. New Zealand Chamber of Commerce, Wellington	1. Mr Redwood 2. Mr E.J. Davis	Secretary
2. Indian High Commission in NZ, Williams Street Wellington	1. Mr Chopra 2. Mr B.N. Sharma	High Commissioner Attache (Com)

FOREIGN MARKET SURVEY REPORT

WEST GERMANY

FOREIGN MARKET SURVEY REPORT

WEST GERMANY

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1. Introduction

West Germany is by far the largest producer of machine tools in Western Europe. With a production of the order of $ 850 million in 1967, it ranks third in machine tool production in the world.

The Federal Republic has a total area of 248,542 Sq.Kms and a population of 60 million (1966). North Rhine Westphalia is the most populous state with 16.8 million people.

Important trade harbours in the Federal Republic are Hamburg, Bremen on the North Sea and, to some extent, Kiel on the Baltic.

2. Economic Outlook

The unemployment rate is an useful indicator of the state of economic health of a country. In the middle of 1965, the number of employed was below 90,000 as against which 3.14 million people were needed to occupy vacant positions in industry. During the recession years of 1966 and 1967, however, the total number of unemployed rose to over 600,000. The West German economy experienced the worst slump during these years since the monetary reform in 1948. Fiscal and economic policies, which had to be applied to control the wage spiral in 1966, stopped economic progress and forced the economy into a deflationary trend. Towards the end of 1967, the economic brakes were released, the bank rates forced down to a low of 3%, the minimum reserves of private banks with a Federal Bank drastically cut and open market operations used to float large amounts of money in the economy.

Increases in exports have also given a positive boost to the economy. During 1968, the German economy is expecting a net surplus of exports over imports of $ 4 million.

The economic situation began to improve and by the middle of 1968, only about 200,000 were unemployed as against which 500,000 vacant positions remained to be occupied. Thus the economy is once again in a full stage of employment.

However, there are still idle capacities in the economy; for example, in the machinery industry, there is still a reserve capacity of 6%. Further, the domestic demand of industrial goods is still considered to be quite unsatisfactory. Entrepreneurs are hesitant to make investments - investments which are now especially becoming necessary in view of reducing labour requirements. These signs of uncertainty are felt to be the last phases of the past recession.

Besides the employment figures, the full employment condition is also reflected by the stock of orders with industry today, which, according to the analysis of the IFO-Institute, have reached the level of 1966. The same signs are also shown by the steel industry, the capacity of which is once again fully utilised, and by the automobile industry, where special shifts have had to be put in to satisfy demand as in previous years. These are all signs of the turning point of the economic cycle.

3. Size Characteristics of the German Economy

The size of the German economy by sectors in terms of employment is shown in the following table:

Table 1

Size of the sectors of the West German Economy by Employment, 1962-66

(000 employed)

	1962	1963	1964	1965	1966
Agriculture, forestry, animal husbandry and fisheries	3383	3230	3084	2966	2877
Production Industries	12916	12969	13022	13218	13103
Trade, transport and commerce	4639	4729	4752	4778	4794
Services	5845	4942	6121	6191	6308
Total	26783	26880	26979	27153	27082

Source : Handbook of Statistics, Wiesbaden 1967

The index of gross national product per person employed has increased from a base of 100 in 1960 to a figure of 126 in 1966.

The contribution of the different sectors to the gross domestic product is shown in Table 2 below:

Table 2

Breakdown of Gross Domestic Product by Sectors, 1966

Sector	Contribution (Million US $)
Agriculture & Forestry	5,053
Manufacturing & Electricity, gas, mining and construction	62,443
Trade, Transport & Communications	23,303
Credit institutions, insurance and other miscellaneous enterprises	16,843
All enterprises	107,642
General Government	12,569
Private non-profit institutions	126
Gross Domestic Product	120,337

4. Factors Affecting Machine Tool Demand

The factors affecting the demand for machine tools are related to the structure and growth of the major machine tool using industries.

4.1 Structure of Metal Working Industries

The metal working industries are a major factor in West Germany in as much as they employ 46% of the total industrial working population of 8.35 million persons and account for 42% of the total turnover of all industries of US $ 87,198 million.

There are in all more than 4000 companies of significance - each with more than 20 employees - in the machinery industry alone, comprising the powerful Association of German Machinery Manufacturers.

Appendix 1 shows the turnover and employment of the different metal working industries.

The trends in production of the various metal working industries are presented in Appendix 2.

4.2 Investments

The capital investment activity of the metal working industry is a key indicator of the demand for machine tools.

Various data have been provided in the Appendices to throw light on the investment pattern in the major metal working industries for the period 1962-64. These Appendices relate to the following:

Appendix 3 - Total investments by value and as a percentage of sales.

Appendix 4 - Breakdown of investment for building construction and for equipment

Appendix 5 - Purpose of investment, i.e., whether for expansion, increase of efficiency or replacement.

Appendix 6 - Reasons for investment, i.e. whether due to shortage of labour, change of products or change to new production methods.

Appendix 7 - Total capacity increase in production.

The labour and productivity situation is presented in Appendix 8 in order to get a complete picture of the industrial economy.

An analysis of the data presented in these Appendices suggests the following conclusions:

a) Capital investment has been on the rise, most of it for the purpose of rationalisation, i.e. increase of productivity. In 1964, the heavy industries directed 54% of their capital investment for this purpose. Equipment accounted for 73% of the total capital investment, i.e. $ 1,140 million, in 1964.

b) The labour market is tight and wages are increasing both in absolute value from $ 0.88 in 1962 to $ 1.15 in 1965, as well as a percentage of sales, from 22.4% in 1962 to 29.4% in 1965. The price index of industrial goods increased only by 5% during this period.

Thus, while productivity did increase, the cost of labour increased faster than prices. In fact, in the early sixties, a wage-price spiral was set off leading to inflationary conditions.

c) General level of labour cost in West Germany, although much higher than India, is still low compared to countries like U.S.A., Sweden and Switzerland, particularly, in the context of the cost of living. Hence, there is rising pressure for further wage increases in several industries, particularly the metal working industry.

d) In spite of heavy investment in rationalisation (i.e., mechanisation, automation, etc.), still much remains to be done in comparison to a country like U.S.A. Further, efficiency increase will become mandatory, particularly due to the increasing labour shortage. Currently, West German industry is drawing heavily on emigrants from neighbouring countries for its labour force.

The major focus of German metal working industry is, therefore, to maintain profitability through better productivity with more efficient machinery and more mechanisation and automation. Further, the tight capital position demands that expenditure for equipment be held down and that the equipment be used more efficiently.

The implications of the above on the nature of the demand for machine tools can be briefly summarised as follows:

a) Machine tools must be more versatile, multipurpose and labour-saving.

b) They must be able to reduce idle time and set-up time.

c) They must be capable of being converted quickly or automatically for several purposes.

d) Machines have to be linked together and fed automatically.

e) Trouble-free operation and minimum maintenance requirements are absolutely essential.

4.3 Geographical Location

The geographical distribution of West Germany's industries and, in particular, the machinery industry can be obtained from Appendix 9. A substantial proportion of the metal working industry is concentrated in the north-western part of the Federal Republic. Specifically, the province of North Rhine, Westphalia has a concentration of the metal working as well as heavy steel industries. Other heavily industrialised areas in Germany are Baden-Wurttenburg, where, in particular, the lighter engineering industry and automobile industries are situated and Bavaria. Even the size distribution of users shows that North Rhine Westphalia is the chief industrial state in Germany.

It is of relevance to mention here that North Rhine Westphalia because of natural resources as well as good markets is also the biggest machine tool manufacturing region in West Germany.

4.4 An Overview of Selected Machine Tool using Industries

A brief overview of selected machine tool using industries is provided in Appendix 10 so as to provide a better perspective of the major customers for machine tools in West Germany. The industries covered in this note are the following:

i) Automotive industry.
ii) Iron and Steel working industry.
iii) Electrical industry.
iv) Machinery industry.

4.5 Vocational Schools

Vocational schools, technical institutes and the like form another sector of machine tool users.

In Germany, however, the structure of vocational and professional training is such that although there is a large number of schools of this type, they can be hardly considered as a good potential for machine tools. After completing elementary education the boy, who leaves school at the age of 14, finds apprenticeship in one of the metal working industries to pursue his professional education. The vocational school to which he is also attached imparts only theoretical training while the firm gives him practical education in its machine shop.

Polytechnics and technical universities do, on the other hand, have machine shops for training and research. Machine tools in these are, however, of the more sophisticated types, since even the students of these institutes obtain their basic practical training in industry.

There were 218 professional schools for industrial training, 211 engineering and technical schools and 9 technical universities in West Germany in 1965.*

5. The Market for Machine Tools

5.1 Current Market Situation

The actual consumption of machine tools in West Germany can be determined from the volume of production plus imports less exports, as shown below:

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* Source: Statistiches Jahrbuch, Weisbaden, 1966.

Table 3

Aggregate Production, Imports and Exports of Machine Tools in West Germany, 1961-66

(Value in '000 US $)

Year	Production	Import	Export	Consumption
1961	686,158	102,241	351,551	436,848
1962	788,887	116,025	386,751	518,161
1963	735,137	69,624	409,551	395,210
1964	763,369	76,821	392,906	447,284
1965	838,371	76,443	400,699	514,115
1966	834,590	70,387	452,489	452,488

Source : VDMA, p.48

Appendix 11 presents the annual purchases of machine tools by types for the years 1961-64.

The market for machine tools dropped by over 20% from 1962 to 1963 which was the year of lowest consumption in the Sixties. The market has picked up since but the 1966 consumption is still below that of the peak year, 1962.

The market is projected at a level of $ 600 million for the year 1970, with the corresponding projection for domestic production at over 1 billion dollars.

Imports have also shown a drastic decline from the peak of 1962.

Imports of machine tools are likely to go down even more, especially imports of the type that are manufactured in West Germany or other Common Market economies. Further, after July 1, 1968, when trade barriers are completely abolished among the Common Market countries, imports of simpler types of machine tools, especially of the type of India would be capable of exporting, are likely to flood the West German market from countries like Italy, France and Belgium, according to the distributors and importers interviewed by the Survey Team.

The Survey Team was not able to obtain any secondary data on the existing stocks of machine tools.

According to theStatistiches Bundesamt, Wiesbaden, about 50% of the installed machine tools in Germany are older than 10 years.

The comparative young age of installed machine tools in Germany is basically due to the fact that German industries were newly equipped after the war. Furthermore, shortage of labour compels industries to invest in newer, more efficient machines; a process which is also accelerated by the technological progress made by the country.

Some idea of the purchases of machine tools can also be gathered from the sample of machine tool users interviewed by the Survey Team.

Till the year 1964–65 major machine tool users, like for instance M/s. MAN in Nurenberg, renewed their stock of those machine tools which were being used for regular production periodically every 5 years. Enterprises which are capital and fixed asset intensive utilized depreciation funds on a regular basis for the financing of investments of fixed assets. After setting in of the recession, however, there had been no investments from this source of financing in the firms visited. In fact even the budget alloted each year for such investments besides depreciation was not utilized for machine tool purchases, but for other purposes.

5.2 Future Trends in Demand

5.2.1 Standard Machine Tools

The following are the trends anticipated in the demand for standard machine tools:

a) In the field of machine specialisation, lathes (particularly, automatic multispindle screw cutting lathes), which account for about 25% of all machines used, will face severe competition from cold extrusion, calcination (sintered powder process) and rectification (grinding) and will account for only 12% by 1975.

b) On the other hand, machines working by abrasives (grinding) will for the same reason increase from 22% to 26%.

c) Gear cutting machines are subject to competition from processes obtaining gears directly by calcination, forging or cold/hot rolling and their percentage will reduce from 6% to 4%.

d) Miscellaneous machines will account for 13% instead of 9% (5% in case of erosion). 1

In view of rising material costs and wages, it is apparent that machine tools which have long set-up times, which consume a relatively larger amount of labour, and which work on slower speeds will invariably have a shrinking demand. The increasing trend towards the adoption of sophisticated types of machine tools point to the need for the conventional machine tools to become:

economical in operation,
maintain quality requirements,
be faster and simpler in operation with push button operation wherever possible,
uptodate in technology,
and, cheaper in price.

Major machine tool users in Germany because of the ready availability of good indigenous products do not prefer foreign makes when buying conventional tools. Quality seems to be the chief determinant in the purchase of machine tools in spite of higher prices of better quality machines.

It must be borne in mind that West Germany is a country where there is no unemployment and where in fact 1.2 million foreign labourers are brought in from neighbouring countries to meet the needs of German industry. Hence there are no economic incentives for purchases of non-automatic equipment. On the contrary Government and banks facilitate investments which are made for purposes

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1 See : French Engineering Industries, March 1968, No.19.

of rationalisation, increasing efficiency and saving labour. The need for accuracy in all branches of industrial production also implies usage of labour only for regulating and controlling purposes rather than for operation.

Another implication of the large number of foreign workers in German industry with lesser skills than the German workers, is the need for easier-to-operate and more rugged and 'fool-proof' machines.

Finally, due to rising cost of labour and material as well as advances in domestic machine tool technology, German machine tool industry is itself moving into the manufacture of sophisticated high-production machine tools. This will inevitably leave a gap for the simpler general purpose machine tools, which will be catered to by neighbouring European suppliers like Italy, Spain and Portugal, who can manufacture this class of machines more economically.

5.2.2 Sophisticated Machine Tools

It was pointed out in Section 4.2 that productivity of labour has not kept pace with wages. Further, labour shortage is a critical problem and the position is expected to worsen in the future. According to the estimates of the German Federal Statistical Bureau, there will be 400,000 fewer workers in the labour market in 1970 as compared to 1966.

In the context of shortage of labour and rising costs, the trend is towards machines which can be operated automatically or semi-automatically, with automatic or semi-automatic loading, chucking and tool-changing for various types of operations.

Further, economic considerations are also responsible for the trend towards universal, multi-purpose machines and the so called "machining centre" which will allow multiple machining operations to be carried out without transfering the workpiece so that there is minimum loss of time in resetting or relocation of work pieces. The latter has been widely publicised during the last few years.

The interviews of the Survey Team with machine tool users also indicated that increasing uniformity of product at high precision and higher production rates with less human labour, together with better methods of production, are the major criteria of users in their choice of machine tools.

While there is an increasing trend towards highly automated machines, it is interesting to note that totally automated machines with numerical controls still have only a limited market. The high capital investment required for a sophisticated N/C machine force users to look at the economics of it very carefully.

For one thing, with the exception of the automotive industry, production lots are much smaller in West Germany than in the

U.S.A. Further, with the rise in labour costs, the set-up time has become an increasingly significant factor. Its significance becomes even greater in the context of the fact that three-shift operations are rare in German industry and, due to the alleged unwillingness of the German workers, even two shifts are hard to maintain, with the result that a high level of productivity is demanded of the remaining one shift. It is felt that amortisation of a high-priced N/C machine in a one-shift operation is not a viable proposition.

The market for expensive machines like the highly sophisticated machining centre with fully automatic tool changing and work transfer is hence likely to remain limited to a few specialist industries. Fully automatic changing of large numbers of tools may be attractive but the cost is very high. A machine with this facility may cost 100 per cent more than a machine having programmed changing of a smaller number of tools placed sequentially in a storage magazine. Where automatic tool changing is required, this rather less versatile version is likely to prove satisfactory for most users. There is, again, a dramatic fall in price when the tool changing function is removed from the control system completely and for the majority of users the most profitable machines will be those with turret tooling or single spindle manual change.

Transfer machines are used extensively for mass production, such as for the automobile industry and its suppliers as well as other industries like ball bearing, appliance components, electric motors and gear manufacturing. The use of transfer machines is, however, limited in other industries mainly due to the lack of sufficiently large production lots.

The rate of application of sophisticated machine tools, thus depends largely on the type of user-industry. Volkswagen, for instance, which turns out about 7000 automobiles per day would require more sophisticated machinery catering to heavy loads, completely automated and with large output, as compared to Messrs. Schull in Hamburg, whose products are rice mills, which are mostly custom-built and where the turnover does not exceed on the average DM 112 millions per annum as against 8 billion DM of VW. Thus N/C controlled machines make up for 40% of the Volkeswagen machine tool stock whereas they account for only about 1% at Schull.

Consideration of all these factors provides the following indicators on the type of sophisticated machine tools required by the German market :

a) Multipurpose or those that can be converted easily by simple adjustments to machining of other products and other chip removal processes. For example, vertical milling machines must be usable for the machining of work pieces of largely varied sizes.

b) Multiple applications require reconstruction of the machines to compensate for the loss of stability. Machines, therefore, have to be heavier and stiffer.

c) Higher production rates require higher cutting speed.

d) The labour shortage has resulted in preference for machine tools into which workpieces can be fed automatically.

e) Users want machine tools, which have shorter set-up times thus leading to higher production rates. Fast processing even with N/C machines is of not much use if tool changing, feeding and checking consume extra time.

5.3 German Standards for Machine Tools

Machine tools in West Germany are subject to the standards laid down by the VDMA(1) and VDW (2). Schlesingers accuracy standards and the DIN norms are used by these two organisations to set up standards. The DIN standards regulate every detail of machine tool manufacturing beginning with the drawings to the assembly and acceptance testing.

For electrical motors and other electrical attachments, German regulations as laid down by VDW are very strict. No machine tool with an electric motor which does not comply with these regulations is allowed to be installed in German industry. The machine tool industry take special care to comply with these regulations since, in the event of an accident due to faulty construction and electrical fittings, the German Professional Association

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(1) VDMA is the Association of German Machinery Manufacturers.

(2) VDW is the Machine Tools Chapter of VDMA representing the interests of German Machine Tool Manufacturers.

(Berufsgenossenschaffen) places the responsibility on the machine tool manufacturer who has then to bear the damages. Hence, the manufacturer ensures that the VDW requirements are satisfied by every machine tool.

Germans follow the metric system and hence all measurements and scaling in machine tools must be in the metric system. The electric current used for machine tools is 220/380 volts, 50 cycles.

6. Profile of the German Machine Tool Industry

6.1 Introduction

The machine tool industry is "The Industry" in West Germany. Germans are traditionally trained for building machinery. They are proudest about their national ability in designing machinery as well as craftsmanship in building it to the highest standards of technology.

Besides the chemicals industry, the machinery industry is the largest in the country. As mentioned in Section 4.1, there are over 4000 machinery manufacturers, each with more than 20 employees, comprising the powerful Association of German Machinery Manufacturers, the VDMA. The Machine Tools Chapter of this Association, called the VDW, has 460 member firms, of which 400 have 20 or more employees each, as compared to 269 machine tool manufacturing firms in the United States.

The machine tool industry is the largest sector in the machinery industry according to the number employed and the second largest in output, next only to agricultural machines.

With regard to quality, reliability and performance, the German machine tool industry compares well with the United States. The United Kingdom and Switzerland are considered to be the only other two countries offering the same quality, followed by Japan, Sweden, France and Italy.

However, in terms of technological advancement, West Germany is considered to be three to four years behind the United States, although the technological gap is closing.

6.2 Domestic Production

Aggregate data on domestic production of machine tools for the period 1961-66 have been presented in Table 3 in Section 5.1 dealing with the current market for machine tools.

Data on production of different types of machine tools is given in Appendix 12 for the period 1961-64. The volume of production in terms of tonnage and the value per tonne of production are presented in Appendix 13 for the different types of machine tools produced in the year 1964.

Production of machine tools has increased from $ 195 million in 1950 to $ 835 million in 1966. Correspondingly the number of employees in the machine tool industry rose from 45,000 to 120,000.

After a period of under utilisation during the recession years of 1966 and 1967, the German industry as a whole is recovering again and the machine tool industry along with it. Today only about 6% the total installed capacity in the machinery industry is idle and this figure may go down still further in the near future. In some States, for instance, in Baden Wurttenberg, the machine tool industry has reached full utilisation and its present turnover is 30% higher as compared with last year.(1)

6.3 Used Machine Tools

Leading distributors of machine tools in West Germany have arrangements for servicing and overhauling old machine tools after which they re-sell in the market. One of the distributors interviewed, Messrs Schreier in Hamburg, claimed that his overhauled machines were as good as the new ones and were considerably lower in price (20% - 30%). He admitted however that sales of used and re-built machines contribute only a very small percentage of his total turnover.

The market for used machine tools is mainly in machines which are very expensive when bought new. But even this market is limited since users of expensive and sophisticated machine tools are generally capital intensive industries, who could afford to buy new machine tools.

6.4 Geographical and Size Distribution of Firms

The geographical distribution of the machine tool manufacturing firms is given in Appendix 14.

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(1) See Article of Hoch in Frankfurte Allgemenie of 22.8.1968

Table 4 below provides data on the size distribution of machine tool manufacturing firms in West Germany by size of employment along with the corresponding breakdown of total number employed as well as turnover.

Table 4

Size Distribution of Firms in the West German Machine Tool Industry, 1963

No. of Employees Per Firm	Percentage Distribution of Firms	Total Employment	Turnover
10 - 19	16.5%	1.1%	1.0%
20 - 49	26.1%	4.1%	3.4%
50 - 99	20.8%	7.2%	6.3%
100 - 199	15.1%	10.2%	9.3%
200 - 299	6.6%	7.8%	7.1%
300 - 499	6.3%	11.6%	12.8%
500 - 999	4.8%	16.1%	17.6%
1000 - 4999	3.4%	31.2%	29.6%
Over 5000	0.4%	10.7%	12.9%
Total	100.0%	100.0%	100.0%

Source: VDMA, ibid, p. 92

6,5 Cost Structure

The VDMA has published some data on the cost structure for the machinery industry as a whole, which is reproduced in Appendix 15. This data has been analysed by size of firm in terms of total production.

It may be noticed that total labour costs are of the same order as, if not slightly greater than, material costs for the smaller firms. As the size of the firm gets bigger, the proportion of material costs increases, but even in the case of firms with total output greater than 50 million DM, labour costs constitute as high a proportion as 30%. This may at least in part be attributed to the fact that rationalisation and other labour-saving techniques are practised more by larger firms than smaller ones.

Table 5 below shows the increase in labour costs between 1962 and 1965:

Table 5

Labour Costs in the Machinery Industry, 1962-65

	1962	1965
Workers' Wages ($ per hour)	0.85	1.06
Commercial Staff Salaries ($ per month)	208	254
Technical Staff Salaries ($ per month)	229	276

Source: VDMA, ibid, p. 122

Labour costs for all industries taken together have gone up 36% since 1962.

6.6 Raw Materials

The following table provides a breakdown of the raw material inputs in the machine tool industry.

Table 6

Breakdown of the Materials Consumed by the West German Machine Tool Industry, 1961

Item of Material		% of Total Materials Consumed
Rolled Steel-semi finished	..	2.6
Foam Steel (cold & hot)	..	5.2
Bar Steel (cold & hot)	..	18.8
Wire (cold & hot)	..	0.5
Rail Overhead Material (crane, rail etc)		0.3
Band Steel	..	2.4
Thick, Medium Steel Sheet	..	17.4
Fine Sheet	..	4.1
Steel Tables	..	4.5
Cast Iron (Pig Iron)	..	27.1
Foam Cast Iron (Temper Steel)	..	7.7
Small Metal Items (screws, nuts, rivets etc.)	..	2.0
Total Materials Consumed	..	100.0

Source: VDMA, ibid, p. 70

German machine tool manufacturers face no problems in terms of availability of the best raw materials. German industry manufacturers almost every industrial product needed by other manufacturers. Further, materials not available can be readily imported since Germany has a surplus balance of trade.

6.7 Delivery Times

In the peak years of the German economy during the late 50's and early '60s, the delivery period for machine tools of all types ranged from 1 - 5 years. However, in the period of recession since 1966, delivery times have come down to 8 - 12 months. Thus, while machine tool users had to previously struggle with manufacturers in getting delivery of machine tools, today, all the firms visited by the Survey Team (Wotan, Klopp, Forst, Schiess) could deliver the machines within 12 months, some of them even ex-stock.

Table 7 shows delivery times for different machine tools from 1965 to the present time:

Table 7

Delivery Times for Various Machine Tools for Firms Interviewed by Survey Team

Product	(in months) 1965	1966	1968	Present
Horizontal boring (on order)	14	12	5 - 8	5 - 8
Vertical boring (on series)	5 - 10	5	ex-stock	ex-stock
Broaching - all types	8 - 12	6	6	10 - 12
Horizontal boring and milling	12	12	10	10
Universal milling (knee type)	8	6	ex-stock	ex-stock

Source: Survey Team

6.8 Manufacturing Practice

We shall discuss here the manufacturing practices followed by the West German machine tool producers, though some of the features are common to all European manufacturers.

German manufacturers of machine tools generally concentrate and specialise on the production of only one or two types of machine tools.

Further, machine tool builders like other equipment fabricators in Europe, do not even manufacture their own castings and forgings. Standard components such as shafts, spindles, bushes etc are also farmed out. From long experience, these manufacturers have been able to locate certain auxiliary manufacturers, on whom they place heavy reliance to supply the required components of the desired quality in proper time. Moreover, factories generally do not find it necessary to carry out any test to determine the quality of the components received. The only exceptions to this are like in the factory visited by the Survey Team which carries out only the hydraulic pressure test for heavy castings. This has also been necessitated due to the fact that this company is a manufacturer of hydraulic broaching machines, in which a hydraulic cylinder operates under pressure. But, in general, because of the trust placed by the manufacturer on the supplier over a long period of association, he does not have any elaborate procedures for inspection and checking of the quality of the supplied goods. This in turn enables reduction in production costs.

Again, all the standard bought-in items like belts, bearings, gears, pumps, electricals etc. can be purchased in the open competitive market to high international quality. The firms manufacturing these items are also specialists in the line and keep abreast of the latest developments in the field. Thus the machine tool industry automatically enjoys the benefits of their experience. Further, West German currency being readily acceptable anywhere in the world, manufacturers can import these items from the best sources.

Regarding electricals, it was noted that the manufacturers prefer G.E., Olivetti, Sperry, Siemens and Telemechanic. But they offer the customer any make of electricals desired by him. Since the manufacturing standards of VDW (the West German Machine Tool Manufacturers' Association) are very stringent as far as electricals are concerned, there is no problem regarding the acceptability of West German machine tools anywhere in the world.

Thus machine tool manufacturers in West Germany essentially concentrate all their efforts on designing, machining and assembling of machine tools.

6.8.1 Design Aspects

One of the manufacturers visited by the Survey Team was a manufacturer of small size general purpose machine tools, but the other three manufacturers' products were such that each machine tool was manufactured only on specific orders. They, therefore, maintained a large design and drawing staff to develop designs tailored to the needs of the customer.

Horizontal boring machines, vertical boring machines could be equipped with N/C or tape controlled if desired by the customers.

The manufacturer of the general purpose machines was found to provide features like hardening of slidways, or grinding of gears only on specific orders of the customer at extra cost. Normally shaping machine slideways were neither hardened nor ground. The Brinnel hardness was about 220 BHN. It was also noted that the screws for the drive of the tool post etc. were annealed and hardened by flame hardening on the same machine by using an additional water jet.

6.8.2 Machines for Machine Tool Production

As regards the use of machines for production of machine tools, in almost all factories, first preference was for their own make; for the remaining machines world renowned makes were invariably selected: for example, 'Boheringer' for planers, "Schiess" for vertical boring mills, 'Churchill' for grinders and 'Herbert' for turrets. For broaching machines, the required special purpose machines were manufactured by the plant itself. None of the four manufacturers visited had any N/C machine installed in its works.

No manufacturer had any system of planned obsolescence of machine tools. This in most cases had led to the use of machines beyond its life period. When a manufacturer is forced to withdraw a machine from the production line because of its age, it is invariably shifted to another department where need for accuracy is less. No accurate census of machine tools was available, but from an eye estimate of the works visited, at least 15 - 20% of their machines must be over ten years old.

6.8.3 Shop Layout

As the machine tool manufacturing firms in Germany mainly carry out machining and assembly jobs, they have a relatively simple problem of shop layouts and material flow. Most of the shops visited were laid out in a way that permitted unidirectional flow of materials from the castings to the finished painting. None of the manufactuerers visited had any modern painting booth and the painting was being carried out in one part of the shop floor itself

6.8.4 Inspection and Quality Control

It has been estimated that the proportion of loss due to rejection is about 6% of the gross production in most leading industrial countries. The reasons for defective work can be due to:

(i) Unsatisfactory design of the product
(ii) Unsuitable or badly maintained production machine tools
(iii) Worn out tools
(iv) Damaged gauges
(v) Inability to measure the product accurately
(vi) Human element.

Quality cannot be inspected into a job, but quality in the machine tool and gauging or measuring system plays an important role in the accuracy and quality of the ultimate product. Automatic measurement and control is one of the methods adopted in USA, but this is supplemented by also checking the completed job. Gauging or measurement must, however, ideally be carried out at the time the product is being produced and 'not after the event', when the inspection is too late. Modern tendency therefore is to use displacement transducers with optical digital readout on the machine tools which monitors continuously the tool or the table. These trends of modern development in quality control does not seem to have affected the machine tool industry in Europe as yet where still the conventional system is being followed.

6.8.5 In-process Inspection

At present all the manufacturers continue to follow a traditional system of inspection and maintain a staff for inspection and quality control. The primary responsibility of inspection in most of the factories rests on the operators themselves who are provided with 'GO' and 'NO-GO' gauges. These gauges are withdrawn and inspected by the quality control department at intervals not exceeding a fortnight. The inspectors from the quality control department also carry out checks using 'random sampling' method.

6.8.6 Inspection Standards after Assembly

After assembly, each machine invariably undergoes a test according to one of the international standards. Dr. Schlesinger's standard is the most popular one. In Germany, DIN standards and standards laid down by VDW are also common. All the manufacturers are in a position to manufacture to any international standard the customer requests. These manufacturers offer the customer a certificate on the tests carried out in their factory but do not call any outside agency to inspect unless the customer specifically insists. Normally customers accept the guarantee of the manufacturer and do not insist on such independent inspection.

6.8.7 Packing

Though proper packaging of machine tools for export is recognised as important, well established manufacturers have so developed their packing methods from past experience, that at present this feature is engaging very little of their attention. All the manufacturers were found to have their own arrangement for packing and despatch.

Regarding packing, one interesting point was noted at the West German factory 'Prokuris-Schiess'. Their seaworthy packing for overseas export is so expensive that management found it worthwhile to re-import the empty packing cases at their own cost. This reduces an unnecessary cost burden on the customer and also enables the firm to re-use the case for their next order.

Generally the machine surfaces are protected by a varnish type protective coating. The machine is then packed in a cellophane bag and crated into wooden crates with proper supports. Some manufacturers have adopted vacuum sealing of the cellophane bag.

The protective coating material was available under various commercial trade names, but the composition of this was not known even to the machine tool manufacturers themselves.

Transport within the country is normally by road and packing, therefore, does not pose any problem. All transport within Europe is also normally carried out by road. Hence good packing only becomes essential while exporting to countries overseas.

6.8.8 Research and Development

All the manufacturers maintained a well staffed design and drawing office, primarily to keep uptodate in the technological development regarding their product as well as to cater to the special need of any customer. Every manufacturer as a rule designs and developes his own machines and foreign collaborations to produce machines under foreign trade names were few in West Germany. As more and more sophisticated machines have been marketed, the manufacturers are increasing the number of engineers on their staff to provide services like tooling etc.

The general practice regarding research and development is that while the manufacturers themselves carry out product development, at their own cost and initiative, they also take the assistance of various universities and research institutions specialising in various fields of basic research.

6.9 Technological Trends

German machine tool technology is well developed and the quality is acknowledgedto be among the best in the world. However, in the field of sophisticated machine tools such as N/C machines, U.S. is still considered to be ahead.

U.S. machine tools enter West Germany only because of their advanced technology. High energy forming, electrolytic machining, laser technology etc. are processes which are relatively unknown yet to most German machine tool users.

In the past few years, however, the technological development of the machine tool industry in West Germany has been rapid. Considerable effort has been devoted to developing N/C machines. Though the adoption of N/C has been slow in Europe as compared to USA, it is nevertheless gaining ground in the market. Three out of the four manufacturers visited by the Survey Team could offer N/C systems on their machines (e.g. Schiess, Klopp and Forst). There were in all 37 machine tool firms out of the total of 370 in 1966 which were building N/C machines. A list of these firms is given in Appendix 16 along with the types of N/C machines manufactured by them. It was estimated these companies had in all built about 300 N/C machines untill 1966.

Electronic controls are made by the German AEG, Siemens, BBC and Grundig companies; by the U.S. companies, General Electric, Olivetti, Hughes, Sperry, Standard Electric; and by European companies such as Ferranti, Philips and Swiss BBC. In addition, some machine tool manufacturers design their own electronic systems (Heller, Schiess). The types of control range from point to point positioning to contour control.

The largest number of machines have straight cut control (51%) while contour control is found in the least number (12%). Information carriers range from electromechanical, decade switches through punched cards and magnetic cores, to punched tapes. A great deal of development in this area is being carried out by the companies as well as the universities.

The main impact of numerical control has tended to be on machines based on drilling and milling processes although in recent years there has been rapid development in numerical control of turning machines and a variety of tape controlled lathes and vertical boring machines will be on exhibition soon.

An intermediate stage between manual and numerical control is the programming of machining cycles by plug board or sequential switching. For many applications, particularly on capstans and milling machines, this form of control has much to offer by simplifying the setting procedure and enabling an operator to attend to several machines.

Inherent in the approach incorporated in many new machine tools is what could be regarded as 'inbuilt accuracy'. One major advantage in automatic operation of a machine by numerical control is the repetitive accuracy inherent in the process. The rapidly increasing number of machine tools incorporating digital readout also have wide appeal. Furthermore, the ability to obtain precise setting of major elements of machine tools with a visual display of relationships in multiple axes and based upon the dimensional requirements of the workpiece, reduces operator strain and probability of error.

In addition to the major elements relating to the control of machine operating functions by N/C, programme control and other methods, and improvements which directly increase the availability of machining time, there have also been developments in the design of machine tools which increase their potential cutting performance. With improvement in machine tool design, better materials inputs resulting in higher rigidity and availability of increased power, speed and feed, greater metal removal is being achieved with sintered, ceramic and diamond cutting tools.

A great deal of research in cutting speed is being carried out in machine tool construction, tool design and workpiece metallurgy, both in the industry and in various technical universities. The Institute of Technology of Hannover, in particular, has completed extensive studies in the metallurgy of metal cutting. In the opinion of experts, the tools that are presently used, have already reached the maximum feasible cutting speeds. A breakthrough toward a substantial increase is not in sight. One exception, however, is grinding. With new ceramic abrasive wheels, periferial velocities up to 180 ft/sec. have been reached in precision grinding (Maschinen and Schleifmittel Werke, Offenbach).[1]

Hydrostatic bearings are being used more and more on larger vertical mills and grinding machines. Spherical bearings can be found on the spindle of several machines.

Higher production rates call for shortening of lead times, The completely automatic operation of machines can be used to full advantage only if automatic handling of the work piece and automatic tool changing are added. Fast processing with numerically controlled machines is of not much use without automatic tool changing, feeding, chucking and positioning of the workpiece. Many types of tool changing devices can be found on modern German machines, from quick hand-operated changers, to turret or sequence magazine changers. (Vereinigte Werkzeugmaschinenwerke, Frankfurt; Huller, Ludwigsburg. Heller, Nurtingen, built a milling-drilling machine with provision for up to 44 tools to be automatically changed.)

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[1] _Foreign Market Survey Report_, U.S. Dept. of Commerce

Pneumatic control and measurement is being applied successfully on machine tools, especially on grinding machines. Pneumatic sensors (Pneumistors) allow high precision and pneumatic activated fast action.

Another major area of technological development is the field of multipurpose machines. For example, the need for vertical milling machines to be applicable for the machining of work pieces of largely varied sizes had led to the development of the vertical boring and turning milling machines. The base with the turn-table remained unchanged. The column was redesigned for the task to be performed or made convertible to the requirements of the workpiece. Adding accessories for milling operation would result in a machining center which will allow various machining operations to be carried out without transferring the workpiece. Another possibility is to build a movable base. This can be moved under a column of a vertical turning or horizontal boring mill (Schiess Co.) Heller is making a numerically controlled milling-drilling machine which will mill the workpiece first and then change to drilling. One of the Heller models has 44 automatically changing tools.

In the area of metal forming, very large hydraulic presses are built in Germany, but the mechanically driven fast forging presses with high power used for crankshaft forging in the USA have no equivalents here.

While in the general area of new metal forming technology, the USA is ahead of Germany by at least 5 years, one exception is electric discharge machining, which is rapidly gaining application, especially in the tool and diemaking industry.

A fair number of German machine tool manufacturers build transfer machines for the automotive industry - e.g. Heller, Nurtingen; Huller, Ludwigsburg; Burckhardt & Weber, Alfing. However, both the U.S. and German automobile manufacturing firms prefer the U.S. transfer machines due to their longer standing and experience.

The technical journals and magazines listed in a later section on "Advertising" (see Section 8.5 and Appendix 21) carry a great number of professional articles by university professors as well as researchers employed in industry. German publications are renowned for their thoroughness. The large output of research studies, pamphlets and text books coupled with publications of individual companies and university dissertations could fill a good-sized library on the subject of machine tools and metal working technology. Unfortunately, except for some digests in English, most of these are only available in German.

6.10 Machine Tool Manufacturers' Association

The German machine tool manufacturers are organised together in the Association of German Machinery Manufacturers (VDMA) which is the apex organisation consisting of all the machinery manufacturing industries in Germany including the machine tool industry. Within this, the machine tool manufacturers have their own special chapter, VDW, which is the association of German machine tool manufacturers.

The function of this association ranges from looking after the interests of the machine tool industry to compiling of statistical data.

Every machine tool manufacturer of repute is a member of VDW. Besides the facilities offered by VDW, it is relevant to note that only member firms are allowed to participate in trade fairs and exhibitions which are organised by the Association in and outside Germany.

The Association does not undertake any activity for the promotion of sales of individual firms. In fact, it takes great pains to ensure that none of its activities may be considered as promotional activities for any one or more member firms in preference to others.

7. Imports of Machine Tools

7.1 Aggregate Imports

Table 8

Import of Machine Tools into West Germany, 1961-66

Year	IMPORTS			As % of Total Consumption
	By Value ('000 US $)	By Weight (Tonnes)	Value Per Tonne (US $)	
1961	102,241	42,307	2,420	23.4
1962	116,025	45,886	2,530	22.4
1963	69,624	19,456	3,580	17.6
1964	76,821	28,316	2,710	17.2
1965	76,443	N.A.	N.A.	15.0
1966	70,387	N.A.	N.A.	15.5
1967	58,000*	N.A.	N.A.	N.A.

Source : VDMA, ibid., p.49

* Estimate of American Machinist

Imports of machine tools into Germany steadily increased from 1956 onwards reaching a record level in the year 1962 when the economy was at its peak. Imports currently constitute about 15% of domestic needs.

The major reason for the record imports in 1962 was the long delivery period for domestic machine tools. Foreign machine tool manufacturers from neighbouring countries took advantage of this position and were able to supply machine tools to German buyers with much shorter delivery times.

As an importer indicated to the Survey Team in Frankfurt, "during this boom year, machine tools even from underdeveloped economies such as Yugoslavia and Spain were enjoying a big demand in Germany". He remarked that machine tools from these countries were of such inferior quality that in normal times they would have been definitely rejected by German users.

Yugoslavia also offered a higher commission to importers - 10% instead of the normal 5 to 7% - thus inducing distributors to import her machine tools.

After the economy passed its peak in 1962, imports declined sharply because of the drop in domestic demand and the expansion of domestic production. In fact, some distributors importing machine tools a couple of years back have now completely stopped buying even a single machine from outside Germany. Imports in 1966 were only $ 70 million as compared to $ 116 million in 1962 - a decrease of 40% in terms of value. The available data for 1967 indicate that imports have declined still further to a level of $ 58 million. However, fiscal measures during 1967 have brought the German economy out of the 1966 recession and, in line with the anticipated balance of trade of $ 4 billion in 1968, imports are also expected to go up. In fact, total imports to Germany increased by 16% in the first seven months of 1968 as compared to the same period in 1967. This general increase in imports will also be reflected in imports of machine tools in particular.

7.2 Types of Machines Imported

Appendix 17 analyses the data on imports by type of machine tool both in terms of value and weight for the year 1964. We have also presented in Appendix 18 data on value of imports by type of machine tool for the period 1961-65.

It is sufficient to observe here that there is a ready market for imports in Germany in the area of special purpose machine tools which cannot be economically manufactured in Germany due to the limited market.

Having such a vast and specialised machine tool industry which has developed to be the third biggest machine tool industry in the world, West Germany, theoretically speaking, does not require any import. Imports, therefore, only come into the picture when the German indigenous industry cannot cope up with the demand as in the boom years or when sophisticated machine tools are not manufactured because of economic reasons or because of political factors. The last mentioned point is applicable in the case of machine tool imports from European countries like Spain and Italy who have very adverse balances of trade with Germany but because of their being good customers for other German products, insist on Germany buying machine tools from them.

7.3 Supplier Countries

Appendix 19 presents the data on imports by type of machine and country of origin for metal cutting and metal farming tools.

The table below shows the aggregate imports from the leading foreign suppliers for the period 1961-64:

Table 9

Aggregate Imports of Machine Tools into West Germany by Leading Supplier Countries, 1961-64

(Value in '000 US $)

Supplier Country	1961	1962	1963	1964
Switzerland	20,208	19,829	17,741	19,916
U.S.A.	32,583	43,096	20,014	17,031
U.K.	7,319	10,221	5,052	8,385
France	7,798	8,881	5,684	6,014
Belgium-Luxemb	6,139	6,192	4,320	4,979
Netherlands	N.A.	N.A.	2,944	4,132
Italy	6,362	6,523	3,495	3,526
Sweden	3,305	3,328	2,225	2,783
Czechoslovakia	3,692	4,445	1,844	2,025
U.S.S.R.	1,773	1,110	467	958
Total Imports	101,610	116,470	68,793	76,247

Source : Foreign Market Survey Report of U.S. Dept. of Commerce, April 1966.

N.B. : Please note that because the difference in data sources, total imports as given above differ slightly from the figures given in Table 18.

The traditional machine tool supplying countries to Germany have always been Switzerland followed by United States. Switzerland has an assured market in Germany for her high precision machine tools such as grinding machines automatic and turret lathes, while United States has been very successful in the export of metal forming machine tools. For example, the complete Body Pressing Machine Tool Department of Volkswagen Works is completely equipped with American presses.

U.K. is a lagging third to Switzerland and USA in terms of share or total imports into West Germany.

On the whole the import of machine tools from the neighbouring Common Market countries is also considerable although individually the countries do not have substantial export to Germany.

Swiss machines enjoy the best reputation not only for quality but for precision, finish and durability. They have been able to establish themselves very well in Germany by their excellent performance. In fact machine tool users interviewed by the Survey Team in Germany were quite willing to pay the slightly higher price for Swiss machines for the sake of their precision and accuracy in performance. The Swiss enjoy a virtual monopoly in terms of reputation for quality among users of precision machine tools.

American machine tools also have a reputation for quality. But, whereas the Swiss machines were always associated with precision and finish, the American machine tools were purchased largely for their high degree of automation and for heavy duty purposes. American machines are furthermore capable of larger production rates. They are faster, more versatile and more powerful than European machine tools. Therefore, American machines were appreciated among machine tool users where uniform production rates have to be maintained for a longer period (for example, Volkswagen Automobile Works) and where extreme versatility is called for American machine tools are also in demand because they incorporate the newest technological developments, which may not be the case with Swiss machine tools.

7.4 Attitudes Towards Imported Machine tools

The German machine tool user has definite associations and images regarding foreign countries. The reputation enjoyed by Swiss machines in Germany has already been referred to in the previous section. Likewise, Germans have a positive image of American machines and, to some extent, British and French machines.

Negative attitudes were observed in relation to products of Yugoslavia, Spain and Japan. One of the major distributors interviewed complained about the quality, precision and finish of Yugoslavian and Spanish machine tools, although he had been marketing them extensively during the peak years in 1960-62. Some Yugoslavian machines, he indicated, are being assembled in Switzerland in order to give them the

Swiss finish and a Swiss image. Otherwise, the market for the Yugoslavian machine tools is steadily on the decrease, specially since German machine tool manufacturers have been able to supply machines in shorter delivery times.

The Survey Team found the German machine tool user to have a strong preference for the indigenous machine tool because of quality even though the price of some foreign machines may be cheaper. Another important factor was the ready availability of servicing facilities. Further, this attitude can partly be attributed to the superiority complex on account of Germany's position in the machine tool industry. Distributors, for instance, who were interviewed by the Survey Team declared without any hesitation that the foreign machines they have been dealing with were definitely inferior to the indigenous ones. This opinion was specially voiced by distributors who had marketed Spanish, Yugoslavian and Italian machines some years ago.

All the machine tool users, who were interviewed, when offered an imported machine together with an indigenous one of the same type would prefer the indigenous machine for the quality. A major user in Nuremberg categorically rejected foreign machine tools on grounds of quality and servicing. Among the medium size and smaller machine tools, however the lower price of the foreign machines generated some interest. A major machine tool user in Hamburg stated that he would prefer an imported machine only if it was considerably cheaper.

Another important factor that exporters of machine tools must pay attention to concerns the finish of the machines about which German buyers are very particular. The Swiss precision machine tools have set a very high standard of finish in the entire European machine tool market. The Survey Team was informed by major machine tool users and distributors that the European machine tool users have got used to seeing the Swiss finish, which was as if the machine had just left an exhibition hall. Further, even German machine tool manufacturers try to please the customer with regard to finish of the machines.

7.5 Trade Barriers

The biggest trade barrier in Germany towards non-European nations is the Common Market. Since July 1, 1968, when all tariffs, border taxes and duties within the Common Market countries were abolished, trade is preferred within these economies. Germany, the biggest machine tool market in Europe will be a major target for machine tool exporters from Italy, Netherlands, Belgium and France.

Im port duties as applicable to outside nations are listed in Appendix 20.

Other preferentials given to GATT members and preferences alloted to "Kennedy-Round" member nations are also shown in this table.

The only other limitation in the form of non-tariff barriers is the turnover equalization tax ranging from 1.5% to 8% levied on duty-paid C.I.F. value of importers.

8. Marketing of Machine Tools in West Germany

8.1 Distribution

Machine tools are sold through three distribution channels in West Germany: (a) directly from the manufacturer to the customer; (b) through a distributor; and (c) through representatives/agents.

It is estimated that 60% of domestically manufactured machine tools are sold directly by the manufacturers to the customers, 30% through distributors and 10% through agents. Imported machine tools are sold mostly through agents or distributor-cum-agents.

We shall discuss each in turn:

8.1.1 Direct Sales by Manufacturer to Customer

This is the most common and preferred channel of distribution.

Reputed machine tool users and even the less well known ones have a standard list of machine tool manufacturers with whom they have been in business contact for many years. When the demand arises for a machine tool, the Purchase Department usually knows exactly to which manufacturers they should write. Representatives and salesmen of the manufacturers also regularly keep on contacting their standard customers to ascertain their requirements. For example, out of the 12 salesmen of a particular company visited by the Survey Team, 7 of them are constantly travelling and visiting customers. Very close contacts and relationships have thus developed among the buyers and sellers over a period of years. To the German machine tool buyer, the purchase of machine tools is regarded as a transaction for which an essential prerequisite is confidence in the manufacturer. Machine tools involve a big investment and the buyer prefers to deal with manufacturers whose products he has had some experience in the past or whose products have a good reputation. The long association which the machine tool user maintains in this way with manufacturers helps him to develop this confidence.

One advantage of dealing with one manufacturer over a number of years is that the machine tool user is certain of availability of machines even in times when the normal supply is limited. Having had a relationship with the manufacturer(s) he always get preference over others.

The second advantage of buying machine tools from the manufacturer direct is that manufacturers usually have a very competent service and maintenance staff which visits the major customers regularly. The interviews of the Survey Team with the sales organisation of machine tool manufacturers also indicated that manufacturers placed great reliance on regular visits and follow-ups by the service staff as a means of sales promotion.

The third advantage as seen by the users is buying machine tools directly through the manufacturer is that pre-sale engineering services which they require are readily available. With the increasing sophistication and complexity of products of the engineering industries, machine tools have to be more and more specially designed and tailored to customer requirements. Medium and small size industries and, to some extent, the large user-industries also, do not have their own machine tool design and development departments. Therefore, they have to rely on the project engineering and design development advice of the manufacturer. Distributors however good they may be are not equipped to provide this service to machine tool users.

8.1.2 Sales through Distributors

An alternative distribution channel for machine tool manufacturers is independent distributors.

These distributors buy machine tools on their own account, stock them if necessary and distribute them according to demand. They are not required to lift fixed quotas from the manufacturer. They also, buy and sell used second-hand machine tools. Some of the distributors stock a wide enough assortment to cater to the varied needs of the machine tool users.

These independent distributors also sometimes function on a representative basis (see next section for the functions of a "representative"), especially in the case of foreign machine tools. Hahn-Kolb represent 3 American companies, Stenssiel Weisbaden 26 American companies and Polack Stuttgart 11 American companies in Germany. One of the distributors visited had the policy of taking on foreign machine tools, specially the ones that were new to him, on consignment basis. He would give these machines for free trial to one of his customers. If the customer was satisfied with the machine he would buy it, otherwise he would ask the manufacturer to take it back.

Big distributors like Hahn-Kolb also have private brands in machine tools.

As a policy, distributors do not deal with conflicting lines. They may deal with affiliated products such as furnaces, welding equipment etc. Generally the distributors handle the entire product range of a manufacturer.

The advantage of distribution through independent distributors for users is that distributors stock assortments of 5 to 10 makes, so that in case of non-availability of certain brands, the users can take on a substitute brand.

The price policies of these independent distributors are very flexible and the distributor determines his own price policy according to supply and demand.

The bigger dealers frame their own sales promotion policy and activities ranging from printing of pamphlets and brochures to organising their own demonstration of machine tools. The bigger distributors have their own show rooms in major cities. Hahn-Kolb of Stuttgart, one of the biggest distributors in Germany, for example, has show windows in almost every major West German city.

The disadvantages of operating through distributors are:

a) Some of the distributors do not somehow enjoy the same reputation as manufacturers who deal directly with the users

b) Another disadvantage is that dealers as such are not allowed to participate on their own in national and international fairs and exhibitions. As stated in Section 6.10, only firms who are members of VDMA and those who are only manufacturing firms are allowed to participate. For foreign manufacturers who are represented by these dealers, it would mean that their machine tools cannot be exhibited in fairs except in cases when they themselves go in for participation

c) The average dealer hardly advertises or promotes the individual product as such. His promotional activities are mainly directed towards building an image of his firm. Products as such are, therefore, hardly advertised. Distributors issue manuals and stock lists, where each machine tool on stock is just mentioned.

However, distributing through dealers also has some advantages. The biggest advantage is that most dealers offer financing arrangements for the buyer. Unless otherwise agreed upon, payment for machinery sold in Germany is customarily expected as follows:

> "One third of the price is to be paid immediately after confirmation of the acceptance of the order, one third when the purchaser has been notified that the main parts of the equipment to be delivered have been completed, and the remainder within 30 days after delivery. Delayed payments are subject to charges of 1% above the local bank discount rates but not less than 5% per annum. In case of litigation the law and jurisdiction of the location of the seller are applicable."*

The medium size dealers interviewed in the Survey also sold machine tools on hire-purchase system in terms of leasing the machines for 12 months at one-quarter of the new price. If at the end of the period the customer wanted to buy the machine, then the price to be paid would be the new price + 10% minus the rent paid to the dealer during the period. Manufacturers, on the other hand, hardly offer any financing facilities to the user. Hire-purchase is very commonly used as a sales promotion instrument by distributors in contrast to manufacturers who do not allow hire-purchase deals when selling directly to customers.

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* Foreign Market Survey Report of the US Department of Commerce.

8.1.3 Sales through Representatives/Agents

The third alternative distribution channel is through representatives and agents.

These representatives and agents work on commission basis and can be appointed on an exclusive as well as non-exclusive basis. The commission usually paid to the agent or representative ranges according to the type of product and the manufacturer whom he represents, from 7 to 15 percent. Sometimes, commissions between 5 and 7% are also given.

The manufacturers interviewed in the Survey indicated that they take extreme care before appointing the agent. Firstly, he must have experience in the machine tool industry so that he is technically competent to deal with the product. He must have an adequate selling organisation under him and, above all, he must have an established name in the market.

Appointing an agent becomes, therefore, a tedious task for many manufacturers. In fact, one of the bigger machine tool manufacturers having had bad experience with the agent, was thinking of having its own sales organisation.

The biggest advantage in marketing machine tools through representatives and agents was their local contacts which would help an unknown manufacturer in entering a new market. Further, if the product was a complementary product to the assortment that the agent already dealt with, then the agent would also be interested in stocking the product since he could increase the variety of his assortment to attract customers.

Imported machine tools in Germany are marketed largely through appointed agents because the foreign manufacturer is not acquainted with the market and this is the only way in which he can establish himself with minimum marketing costs. Some of the bigger agents represent over 20 foreign manufacturers.

All sales promotional activities are the responsibility of the manufacturer, when marketing through agents.

8.2 Sales Promotion

Table 10 below presents the average expenditures on sales promotion and their breakdown for the German machinery industry as a whole, of which the machine tool industry is a part.

Table 10

Sales Promotion Expenditures of the West German Machinery Industry, 1956-60

		1956		1960
Expenditure as % of turnover		1.1%		1.0%
Press Advertising				
Home	21.0%		20.3%	
Abroad	8.0%	29.0%	6.8%	27.1%
Printed Advertisement Material (Catalogues)		28.1%		25.9%

		1956		1960
Exhibitions and Fair				
Home	14.7%		17.4%	
Abroad	4.8%	19.5%	6.9%	24.3%
Address books		2.6%		1.9%
Filing		2.7%		3.1%
Other Sales Promotion		18.1%		17.7%
Total Expenditure on Sales Promotion		100.0%		100.0%

Source : VDMA, ibid, p.69

The variation in expenditure on sales promotion for the industry is shown by Table 11.

Table 11

Pattern of Expenditures on Sales Promotion for the West German Machinery Industry, 1956-60

Proportion of sales promotion expenditures to turnover	% of firms	
	1956	1960
Under 0.1%	0.5	1.0
0.1 - 0.5%	24.1	24.5
0.6 - 1.0%	34.6	32.6
1.1 - 1.5%	19.7	20.7
1.6 - 2.0%	9.2	10.9
2.1 - 2.5%	4.6	4.8
2.6 - 4.0%	5.9	5.0
Over 4.0%	1.4	0.5
	100.0	100.0

Source : VDMA, ibid, p.70

In the sample of machine tool manufacturers interviewed, the expenditure on sales promotion ranged from 3% of a total turnover of $ 5 million to 7% of a total turnover of $ 20 million. Big distributors like Hahn-Kolb in Stuttgart are said to spend about 3 to 5% of their total turnover on sales promotion.

When marketing through distributors the machine tool manufacturer does not contribute to the advertising done by the dealer. Only in cases where marketing was done directly to the consumer or through the agent does the manufacturer bear the entire advertising costs.

Advertisements in the domestic press media accounted for the largest single item of expenditure in the total budget. The media chosen were mainly professional and technical journals. Professional journals and technical magazines abound in West Germany. A list of the well known and widely read technical magazines is given in Appendix 21.

The frequency of advertising, in the case of one of the companies interviewed by the Survey Team, Messrs. Scheiss in Dusseldorf, was stated by the Sales Director as "as often as the technical journals are published, i.e. monthly, quarterly, half-yearly or years."

In addition to advertising in professional journals, manufacturers also participate regularly in trade fairs and exhibitions. Exhibitions are major marketing tools in Europe, especially in Germany. Manufacturers participate in practically all national and international shows. In fact, exhibitions are becoming so numerous in Europe that manufacturers are beginning to find them an increasing burden. The major companies budget exhibition expenses far beyond the usual level in America, for it is considered very important for prestige goodwill to be seen with substantial pieces of equipment at the major exhibitions.

The international machine tool show in Hannover is a major exhibition which attracts considerable number of buyers of machine tools.

One of the major functions of the Marketing Department of machine tool firms is the organisation of participation in such exhibitions. It emerged in the course of the interviews that the next fair which was of great importance to the manufacturers visited was the Olympia Fair in London and the Osaka Fair in Japan.

Further, demonstration of machine tools is utilised as another important and effective sales promotion device. One of the manufacturers visited by the Survey Team regularly demonstrated its machine tools about twice a year. Distributors, agents and some end-users were invited to these demonstrations. Demonstrations, however, were more of a regular feature among distributors than among manufacturers.

Pamphlets and catalogues are, of course, a standard feature of sales promotion activity. They are printed on a regular basis at least 4 times a year and even more frequently depending on developments and innovations. One of the manufacturers interviewed regularly published articles in journals and in prescribed text books on the development of technology in his firm.

50% of the sales promotion expenditure is spent on press insertions and printing and mailing of catalogues while the other 50% is spent on demonstrations and private shows.

8.3 Other Marketing Aspects

Warranty

Machine tools sold by manufacturers have to be accompanied by a warranty as prescribed for the machine tool industry by the Machine Tool Manufacturers' Association, VDW. The usual specification of the warranty is six months free service if the machine is used on a two-shift basis and 12 months if it is used on a one-shift basis.

Any repairs falling within the warranty period which are not caused by the faulty handling of the machine tools have to be borne by the manufacturer.

Guarantees have also to be given on the same basis if the machine tools are sold through an independent distributor. However, during the guarantee period at least, the distributors are not required to handle repairs, which is the responsibility of the manufacturer.

After Sales Service and Spare Parts Supply

Regarding follow-up after sales, salesmen make it a point to visit the machine tool user very often, specially in the initial period of sales to check whether the new machine is being handled according to the specifications laid down by the manufacturer. Any faulty handling or non-compliance with the instructions for use releases the manufacturer from his guarantee.

In addition to manufacturers, distributors also stock certain standard spare parts. This applies to imported machine tools also.

8.4 Marketing Organisation

The marketing organisation of a major machine tool manufacturer, who was interviewed, M/s. Scheiss of Dusseldorf, consisted of the Sales Director at the top of the hierarchy, who was also a member of the Board of Directors. Under him, the Assistant Sales Director was in charge of a number of departments - the contract department, the order preparation department and the transport and packaging department. Due to the fact that this company mainly produced custom-made and special purpose machine tools (about 65% of the production was on order), they do not see any need in maintaining a separate Market Research Department.

Sales forecasting was not practised on a regular and systematic basis by machine tool manufacturers. Production was planned by previous experience, Market Research consisted mainly of an analysis of competition because, even among machine tool manufacturers of sophisticated types, competition is one factor of the environment to which they have to constantly adapt.

Product research was carried out in the afore-mentioned firm in terms of ascertaining the exact trends in the machine tool user industries and studying the products of the competitors, especially in foreign markets. This function was carried out by their Construction Department. Fairs and exhibitions were also of great help in conducting this activity.

The Advertising Department was a separate department under the Sales Director. All advertising was channeled through the professional advertising agencies, although the firm's own Advertising Department instructed the agencies when to advertise and how often to advertise.

8.5 Purchasing Systems of Machine Tool Buyers

Purchase procedures of machine tool buyers vary from industry to industry, depending on the size of the firm and its organisational set-up.

In the case of big machine tool users like the one visited in Nuremburg, the responsibility for purchasing machine tools lies with the Works Manager who coordinates it with the Development Manager of that particular department. For instance, the Department handling diesel motors made its machine tools purchasing decision independent of other departments. The need for machine tools may be generated by the development of new products, or after existing machine tools have become obsolete or unusable. In every case, need for new machine tools is assessed by the concerned Development Manager.

In this firm there is a budget allotment for the purchase of machine tools every year. Under no circumstances is this allotment exceeded. This budget is, however, large enough to cover all the purchases ranging from replacement to new purchases.

The Purchase Department, has a standing list of machine tools suppliers to whom these requirements are then passed on. The final decision, as to whether a machine tool will be purchased or not, lies with the Director of the Department. However, he is influenced and advised by various engineers of the department, by the Development Manager, and at times, by the foreman also, who is in actual contact with the machine.

The criteria which influence the decision of the Director in purchasing a new machine tool are, first, the quality of the machine tool; second, availability and after-sales and other services, and, only lastly the price.

The final ordering and processing of the order is left to the Purchase Department.

Since the Purchase Department had already a standing list of machine tool manufacturers on its record with whom they have established contacts for long period, it would take a lot of convincing and marketing effort on the part of an unknown foreign machine tool manufacturer to get his machine tools through. It also appears to be necessary to convince the decision maker i.e. in this case, the Director, of the quality and performance of the unknown foreign machine tool since quality is the major influencing factor. The foreign machine tool manufacturer should hence convince him of the parity of his product with the indigenous machine. Getting his name on the list of machine tool suppliers with the Purchase Department is, perhaps, the first step towards getting an order.

Constant visits of representatives or agents showing the Purchasing Department the advantages of the foreign machines and expression of willingness to give these machine on trial periods and consignment basis would go a long way in establishing the confidence which a German machine tools buyer requires as a pre-requisite to all his purchase.

With regard to the question of tenders, private firms do not issue public tenders inviting quotations but write to firms directly who are already in their standing lists. Government agencies and Government contracts are, however, done on tender basis and the tenders are published in all daily economic newspapers.

8.6 Machine Tool Prices

Machine tool prices have been moving in the following fashion in the decade, 1954-64.

Table 12

Index of Machine Tool Prices in West Germany 1954-64

(1962 = 100)

Year	Metal Cutting Machines	Metal Forming Machines
1954	71	70
1955	74	72
1956	79	76
1957	83	79
1958	85	82
1959	84	83
1960	88	87
1961	94	93
1962	100	100
1963	102	101
1964	108	107

Source : VDMA, ibid, p.120

The pricing of machine tools as indicated by the manufacturers interviewed is done basically on the cost plus margin basis although in times of recession such as the German economy just experienced, pricing policy is influenced by competition. Machine tool manufacturers were forced to reduce their prices upto 10% in order to maintain market share during the recession years of 1966-67. This led the machine tool industry, according to one of the manufacturers, "into disaster".

9. Exports of Machine Tools From West Germany

West Germany has traditionally been in the forefront among the major exporters of machine tools in the world. Exports account for over half of the aggregate machine tool production of West Germany. The percentage was even higher for the sample of machine tool manufacturers visited by the Survey Team - the sample average was as high as 68%. The German machine tool industry is, like many other major industries of West Germany, very export oriented.

9.1 Aggregate Exports

Table 13

Exports of West German Machine Tools, 1961-66

Year	Exports			As a % of
	By Value ('000 US $)	By Weight (Tonnes)	Value per Tonne (US $)	Total Production
1961	351,551	146,392	2,400	49.2%
1962	386,751	151,141	2,500	47.1%
1963	409,551	153,586	2,600	53.5%
1964	392,906	144,471	2,700	51.5%
1965	400,699	N.A.	N.A.	47.8%
1966	452,489	N.A.	N.A.	54.2%

Source: VDMA, ibid.

Exports have hit a new high of $ 450 million in 1966 after fluctuating at about $ 400 million during the four year period, 1962-65.

9.2 Exports by Types of Machine Tools

Appendix 22 gives the breakdown of 1964 exports of German machine tools, by types and countries of destination.

The summary position by types of machine tools alone is given in Appendix 23.

9.3 Leading Buyers

The table below shows the trends in purchases of German machine tools for the period 1961-64.

Table 14

Exports of West German Machine Tools by Selected Countries of Destination, 1961-64
(Value in '000 US $)

Country of Destination	1961	1962	1963	1964
(A) Europe ..	233,000	267,219	304,339	280,066
France ..	38,965	40,647	47,780	48,718
U.K. ..	29,377	34,351	30,557	38,187
Italy ..	34,759	42,162	68,620	35,187
Sweden ..	16,196	19,024	15,652	18,771
Belg.-Lux ..	20,318	11,847	19,286	17,924
Netherlands ..	N.A.	N.A.	15,035	16,962
USSR ..	12,194	8,682	8,877	7,623
Czechoslovakia	2,314	3,077	1,654	4,818
(B) Overseas ..	118,321	118,951	102,345	109,893
U.S.A. ..	10,829	10,727	11,321	15,316
Canada ..	1,838	2,268	3,196	3,655
Total Exports ..	351,321	386,171	406,684	389,959

Source: Foreign Market Survey of U.S. Dept. of Commerce

N.B. Please note that because of the difference in data sources, there are slight discrepancies in the total export figures as given above from the figures given in Table 22.

The largest buyers of German machine tools have always been neighbouring European countries. Europe as a whole accounts for about 70% of Germany's total exports. Specially after the formation of the European common Market and more recently after July 1, 1969, when tariff barriers within the ECM countries have been eliminated, Germany will have easier access to the machine tool markets of these countries.

Among the European countries, France, U.K. and Italy are Germany's biggest customers in terms of sheer quantum of purchases.

Germany's exports to the U.S. were static at the level of $ 10 million during the three year period 1961-63 but increased significantly by 50% between 1963 and 1964. Indeed, more recent data that is available on imports of machine tools to U.S. reveal that West Germany increased her exports to the U.S. by as much as 300% between 1964 and 1967 when the surge in military procurement produced by the Vietnam War enormously increased the demand for machine tools in the U.S. and the domestic machine tool industry could not cope with the demand. Exports of German machine tools to the U.S. increased as follows between 1964 and 1967.

Table 15

Exports of German Machine Tools to U.S.A., 1964-67

Year		Exports (Million US $)
1964	..	15
1965	..	19
1966	..	35
1967	..	51

9.4 Marketing for Exports

Exports are mainly done through private channels and the State plays a very minor role in this matter. Even a very important aspect like inspection and quality control before export is left entirely in the hands of the manufacturers.

German machine tool manufacturers appoint agents/representatives to organise the distribution of their products in export markets. These agents also undertake pre and after sale services. In many cases, the Survey Team was told that reputed foreign agents/representatives themselves approached the German firms; alternatively, the manufacturers advertised in trade journals, which are printed in many languages, have a circulation throughout the world and are considered the best media for reaching foreign distributors. Another useful means for establishing contacts, according to the German machine tool firms visited by the Survey Team, was at exhibitions and trade fairs.

Another export channel used by some German machine tool manufacturers is through an "Export Association", Whilhelm H. Holm, which was established in 1929 on a private basis. It now has about 120 machine tool firms as members. This Association is exclusively concerned with exporting German machine tools on a world-wide basis and does not sell them in the domestic market itself. It works for its member-firms on a commission basis. The firm undertakes all the export marketing efforts for its member-firms including export promotion.

This Associations also operates through local agents in the various foreign countries. Their local agent in India is Francis Klein in Bombay.

Liaison with the local governments is another of its functions, especially in the developing countries, where as the Export Manager for East Asia stated: "Business is a matter of good relations and having the right people at the right place."

Another important function of this export consortium to carry out market research in the exporting countries and provide regular feedback to its member-firms.

This consortium of about 120 firms has proved to be very efficient for many decades now. Its present turnover should be over $ 50 million a year.

It may be added that this consortium also handles to a very limited extent machines from countries like France, Switzerland and Italy. These sales of non-German machines contribute only a very small fraction of its total turnover. In fact, it is not particularly interested in representing foreign firms, since as an Association of German manufacturers they are, naturally, primarily interested in exports of German products only. Another reason why this consortium does not handle foreign products is, according to the Association Manager, the following: "When foreign customers send enquiries for certain machine tools to our consortium, it is because they want

German machine tools, as otherwise they would not write to us but to the respective countries". It has happened many times that "quotation of Swiss and French machine which were forwarded, were returned since the customers specifically wanted a German machine tool". Hence, only in the case when a German machine tool is not available, does the consortium quote a foreign machine.

In this context, it must also be stated that the Export Manager for East Asia, who is very well acquainted with the Indian machine tool industry, (he was a member of the Vollrath Commission to India) is willing to take on a certain amount of Indian machine tools.

9.5 Export Credits, Guarantees and Other Export Facilities

9.5.1 The Financing of Exports

There are two institutions in the Federal Republic which specialise in providing medium or long term financing facilities to foreign countries for purchase of German goods.

These institutions are: the AKA Ausfuhrkredit-Gesellschaft mbH (Export Credit Company or AKA) and, the Kreditanstalt fur Wiederaufbau (Reconstruction Loan Company or KfW), both of Frankfurt (Main).

The AKA deals with the financing of export transactions with credit periods of up to 8 years at most, covering manufacturing time and financing after delivery. German exporters requiring even long-term financing are mainly served by the specialist institution, KfW. This was founded in November 1948 as a financing institution incorporated under public law, and one of its branches has since 1958 been gaining importance is the financing of long-term export business in capital goods.

The AKA was founded early in 1952 by a consortium of 29 West German banks and bankers led by the Deutsche Bank AG.

The different types of export credits provided to German exports are as follows:

(a) Plafond A: This is the AKA's own credit facility in an amount of DM 2,500 million, composed of the AKA's own founder-contributed resources, and an agreement to contribute supplementary finance for a total of DM 1,250 million by the founder consortium. Interest is at present 6.25% p.a. This rate is subject to money market conditions. 1/2% p.a. commitment commission is also charged from the date of earmarking the loan till it is actually availed of as laid down in the financing plan.

(b) Plafond B: This credit facility consists in the readiness of the Deutsche Bundesbank to rediscount drafts up to a limit of DM 2,500 million. It is normally available for the financing of exports to the developing countries. Interest is 1½% above the official Bundesbank discount rate, i.e. 4½% p.a. at present. 1% p.a. commitment commission is charged from the date of earmarking the loan till it is actually availed of.

The AKA decides as to which of the two funds should finance each loan application, on the basis of the current degree of utilisation of each fund.

Applications for financing can be entertained in respect of only firm delivery of contracts with a proven credit need, for a minimum duration of 12 months.

Loans may only be granted where the manufacturer cannot supply finance out of his own resources or by some other alternative means. Conditions of payment arranged with the foreign customer must correspond in principle with normal trade practice, so that the export credit is not used to quote particularly attractive prices or deferred payment terms, differing considerably from quotations by home and foreign competitors.

The borrower must himself bear a certain proportion of the financing of his export deal (self-financing quota).

Under 'Plafond A' credit scheme, this quota is equivalent to the risk proportion the exporter himself must shoulder when Federal Government ('HERMES') export insurance policies are issued to insure against business or, in exceptional cases, political risk.

Under 'Plafond B' credit scheme, the exporter's self-financing quota is 30% of the value of the order.

Under its credit conditions the AKA may grant export credits under 'Plafond A' to provide finance during the manufacturing stage and/or after delivery. The maximum life of the loans is eight years.

The maximum life of credit under 'Plafond B' is four years.

The KfW was established by law after the last war and was mainly concerned with public finance transactions intended to improve the post-war economic situation of the country. It was entrusted with the distribution of ERP* counterpart funds. It was also engaged in medium - and long-term export financing.

The requisite funds are made available to the KfW partly from a special credit line of the Federal Government (ERP Counterpart Funds) and partly by way of Federal loan. The KfW is also able to raise money on the capital market by the issue of bonded loans.

One of the conditions for KfW financing is that there should be no other way of financing the planned export. The credit is usually granted to correspond with the periods for payment insured under the same transaction by the HERMES-Kreditversicherungs-AG. Interest is based on the current conditions imposed by the money market, and at present is about 6½% p.a., plus commitment commission for the period between the earmarking of the credit amount and the date of availment.

It often happens that in long-term deferred-payment transactions the KfW undertakes the financing only for the outstanding period of the suppliers' crddit, once the first four years of the credit have been financed by the AKA. It is also possible to obtain so-called 'financing credits' with a minimum life of 5 years; in these case not the German supplier but the foreign purchaser is the borrower.

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* ERP stands for the Economic Recovery Programme.

9.5.2 Export Credit Insurance

Risk coverage as required in connection with export credits can in certain conditions be arranged by means of guarantees and sureties issued by the Federal Government. The legal framework for such backing is provided by the Federal Budget Law. Under this, the Federal Minister of Finance is entitled to assume guarantees and sureties not only for supplier-to-purchaser credits with a maximum life of 5 years, but also to assume sureties, guarantees and other indemnities for suppler-to-purchaser credits with a life exceeding 5 years, provided the West German State is particularly interested in the completion of the export transaction concerned. When these sureties or guarantees are assumed by the Federal Government, the HERMES-Kreditversicherungs-AG acts as its agent, and, hence, such indemnities are often described as 'HERMES cover'.

The risks covered are:

(a) Production Risk (risk before despatch of the goods);
(b) Export Risk (risk after despatch of the goods)

Cover for transactions with foreign private enterprises is afforded by means of 'Garantien' or guarantees. If, however, the foreign purchaser is a State or public authority, cover is afforded by means of 'Burgschaften' or sureties.

(a) Production Risk (in which cover is provided for the prime costs of the deliveries and services contracted for:

Here the exporter insures against the risk of finding it impossible or unreasonable to continue manufacturing, or deliver finished products, because:

(i) the foreign customer has suffered financial losses or other business difficulties or, if the order was placed by a State or public authority, the agreed pre-payments have not been received six months after due date;

(ii) subsequent to contracting, political events, or measures taken by foreign Governments, make it impossible to effect delivery of goods.

Generally the premium is 1% of the prime costs covered. However, should export cover also be granted for the same transaction, the premium for cover of production risk is only 0.75%.

(b) Export Risk (in which cover is provided for the purchase price agreed in the contract):

(i) Under Export Guarantees the following risks are covered:

(a) Business risk, i.e., irrecoverability of debts owing to the inability to pay of the foreign debtor;

(b) Political risk, i.e., irrecoverability of debts owing to general government measures taken by the debtor country, or to certain political events, or to stoppages in the completion of payment.

Export guarantee costs are calculated at a basic premium of 1.5% of the claim insured and an additional time premium of 1% per month of the outstanding loan amount starting with the seventh month of the loan; if the loan is granted for six months or less, only the basic premium is charged.

(ii) Under Export Sureties, cover is provided for the political risks described above. Such sureties also operate if the foreign debtor has not settled the claim six months after it falls due, or has not taken up the documents six months after arrival of the goods.

The basic premium for an export surety varies between 0.5% and 1% according to the amount covered. Supplementary time premiums, which in this category are charged for the whole period of the credit, are levied at the following rates on the amount outstanding:

0.5% for each month entered on where loans run for up to 2 years;

0.4% for each month entered on where loans run for more than 2 years.

Conversion and transfer risk is included under political risk in every export guarantee or surety. But it can also be covered by itself in transactions with both private and official purchasers. Conversion and transfer cover is applied, also to exchange losses suffered in the conversion or transfer of amounts which with the agreement of the HERMES-Kreditversicherungs-AG have been deposited in domestic currency in the debtor country, unless this happens to be the currency specified in the contract.

The basic premium for this type of protection is 0.4% of the insured claim. If the life of the loan exceeds six months a time premium is charged in addition; this comes to 0.1% per quarter entered upon, calculated on the outstanding loan amount. In each of the various types of export risk cover, the amount of compensation is restricted to a definite proportion of the damage. This is generally

80% of losses incurred under business risk, 85% of losses on conversion and transfer or owing to payment prohibitions or moratoria, and 90% of losses caused by other political events. The remaining 20% (or 15% or 10% respectively) must in each case be borne by the exporter himself.

Where production risk is concerned, the exporter has to meet a flat 15% of losses incurred on prime costs.

The foregoing remarks all apply to the financing of suppliers' credits granted by German exporters to their foreign customers, and to ways and means of insuring against the attendent foreign risks.

In cases where, as mentioned above, the KfW grants direct credit to the foreign debtor, it provides the advance to finance commendable projects or if it is in the particular interests of the Federal Republic of Germany. The KfW's interest rate is based on current money market conditions and is at present in the region of 6%, plus commitment commission for the period between earmarking the money and availing of it.

As in the case of Federal Government sureties or guarantees for suppliers' credit, the following principles apply equally to Federal Government sureties or guarantees for financing exporter's credits:

1) Both business and political risk is covered.
2) Adequate pre-payments or deposits are required.
3) The exporter or granter of credit is required to bear a certain percentage, which varies from case to case, of any loss incurred under the risks covered.
4) Compensation is paid out only after a certain period of non-availability.

Besides these credit and insurance facilities to German exporters, the Finance Department offers tax-rebates. There is a rebate of the value added tax on all goods exported. Germany maintains free trade zones (e.g. Schipol, Hamburg) where imports may be brought in without taxes or duties being levied. Imports for re-export will never have these duties levied, when shipped from free zones. In addition to regular bonded warehouses where imports may be kept exempt from duties certain private firms maintain their own bonded warehouses. The parts imported to be re-exported with the assembled machine can be stored and used without payment of taxes and duties. Once paid, however, duties are not rebated.

9.5.3 Other Export Facilities

Though West Germany does not maintain extensive official export institutes like the Institute of Foreign Trade in Italy, the Government does help German exporters in the following manner:

(a) Federal Office for Foreign Trade Information (BfA)

This is a devision of the Federal Economic's Ministry, and it is responsible for all matters pertaining to Foreign Trade. It has three departments: Publications, Commercial and Legal Services and Foreign Market Information.

Commercial information is published in a weekly magazine. BfA also publishes country and market profiles, economic studies, legal guides, special studies and guides on selling methods abroad.

(b) Trade Fairs

Participation by the Government usually takes one of three forms: Information Centres, Representative Shows, and Government Industry exhibits. Other than this the Government does not participate in fairs.

10. Exports of Indian Machine Tools to West Germany

10.1 Aggregate Exports

India's exports of machine tools to West Germany have steadily climbed from a small beginning of Rs.1.11 lakhs in 1965-66 to Rs.1.66 lakhs in 1966-67 and Rs.2.75 lakhs in 1967-68.

10.2 Export Marketing Efforts

It is only recently that Indian machine tool exporters have initiated efforts to establish a foothold in a rich market like West Germany.

Hindustan Machine Tools has a branch office at Frankfurt which takes care of not only West Germany but also other neighbouring countries like France, Italy and Spain. The primary function of this office, at least for the present, is to appoint distributors in various European countries. It has been able to secure three agents for HMT machines in West Germany. No contacts had been established as of June 1968 in the other countries.

In addition to appointing distributors, Indian manufacturers need also to undertake effective sales promotion activities to create awareness of Indian machine tools and build an image for India as a supplier of quality machines. Nearly everyone interviewed by the Survey Team in West Germany was totally ignorant about Indian machine tools. In contrast, Japanese export efforts for its engineering products as a whole were extremely effective. For example, every engineering trade journal carries the advertising of Japanese engineering goods as a regular feature.

Some of the problems inhibiting the export of Indian machine tools relate to transport, delivery time and lack of adequate funds for export promotional activities.

The Survey Team's visits with German machine tool buyers who had bought Indian machine tools revealed considerable disillusionment on the part of the users with Indian machines. In one instance, the customer on opening the packing of the Indian machine tool found that it had been so badly packed that it was chipped and totally rusted. Another customer, found that the iron chips which had fallen when the machine tool was tested in India had not been cleaned properly. In fact, the painting had been done on the iron chipping. In yet another instance, the whole coolant system of the machine was blocked by dirt and iron fittings because it was not cleaned.

It was also felt that many of the machines which Indian manufacturers were attempting to export were of pre-World War II vintage which, naturally, did not have much of a potential in West Germany.

Further, in addition to the quality of the machine, the German buyer is also particular about the appearance and finish of the machine. According to German buyers, Indian machine tools do not, presently at least, meet the minimal requirements in this regard.

As an observer of the last Hanover fair indicated, the Indian machine tools exhibited there were nowhere near the products of other countries exhibited in neighbouring stalls, particularly in terms of finish and appearance. This observer felt that particularly the machine tools that are displayed in fairs should have a special finish.

The Engineering Export Promotion Council has a branch office in Dusseldorf which looks after the entire ECM market. This office assists to whatever extent is possible, the export efforts of Indian machine tool manufacturers who approach them for this purpose. It gets about 20 enquries on the average in a month from Indian machine tool firms who are interested in exporting to Europe. As yet, no regular reporting and feedback system has been evolved for transmitting information back to Indian manufactuerrs. Further, the EEPC helps to establish direct contacts between Indian manufacturers and users. They also publish pamphlets and brochures off and on.

The EEPC has a show room in its Dusseldorf office, of about 100 square metres in size. This show room is however packed with a wide range of engineering products from machine tools to bicycle chains to forks and knives.

The EEPC collaborates with the Frankfurt office of HMT in participation of fairs in Germany as well as in other European countries.

Exporters of Indian machine tools to West Germany will, however, have to take steps to counter the two factors that impede speedy market development:

a) The complete ignorance among German users with regard to Indian machine tools: The germans cannot even imagine that India can produce small engineering items, not to speak of machine tools. Distributors and users interviewed by the Survey Team quite frankly indicated that they had never heard anything related to Indian Engineering products.

b) The other inhibiting factor is the fear among potential customers that Indian machines are too simple and qualitatively not upto German standards.

In the circumstances, the first step is to break these barriers and acquaint the potential buyers with Indian machine tools of exportable standard.

11. Summary of Findings and Recommendations

A summary of the major findings of the Export Market Survey in West Germany is presented first followed by recommendations for developing exports of Indian machine tools to this rich market.

11.1 Summary of Findings

1) The German machine tool market is of the order of $ 450 million and is the largest market (along with the U.K.) next only to the U.S. ($ 1,800 million) and U.S.S.R. ($ 950 million).

2) It is also the third largest machine tool producing nation in the world with a quantum of production worth $ 850 million in value.

3) Still, in order to meet the huge domestic demand, it imports about 15% of its requirements. Imports were at their peak in 1962 when, because of the long

delivery period for domestic machine tools caused by the boom in industrial development, imports that year were of the order of $ 116 million. Subsequently, imports dropped significantly because of the decline in domestic demand and the expansion of domestic production. Nevertheless, 1967 imports still amounted to $ 58 million by value. Further, fiscal measures during 1967 have brought the German economy out of the recession and, due to the expected export surplus of $ 4 million in 1968, imports in general, and of machine tools in particular, are expected to go up.

4) The following table shows the breakdown of the 1964 imports of $ 76.82 million by major supplier countries:

Total imports into West Germany in 1964	..	$ 76.82 million
Switzerland	..	32%
U.S.A.	..	22%
U.K.	..	11%
France	..	8%
Netherlands	..	5%
Italy	..	5%
Sweden	..	4%

5) The types of machine tools imported are mainly sophisticated, high precision machines, as reflected by the fact that the major supplying countries are Switzerland and U.S.A. which account for half of Germany's machine tool imports. The former has an assured market in West Germany for her high precision machine tools such as grinding machines, automatic and turret lathes while the latter has supplied advanced metal forming tools of the kind not domestically manufactured, particularly for the automobile industry.

6) Productivity of German workers has not kept pace with wages. Further, labour shortage is a critical problem and the position is expected to worsen in the future.

7) In the context of labour shortage and rising costs, the trend is towards machines which are versatile, geared to high production rates with less human labour and with automatic or semi-automatic controls.

8) The German machine tool industry due to relatively low production costs as compared to other advanced

countries like U.S.A., Switzerland, Sweden and France is very competitive in the home market when compared to products from these countries.

9) Thus exports of sophisticated and precision machine tools to Germany is relatively "easy", and accounted for about 60% of the machine tool imports in 1964 whereas conventional and simple types of machine tools are generally imported only when domestic manufacturers cannot deliver in time. Furthermore, in the field of sophisticated machine tools, there is not much competition among supplying countries while it is considerable for conventional and simple machines.

10) It must, however, be noted that due to rising costs of labour and materials as well asadvances in domestic machine tool technology, the German machine tool industry is itself moving into the manufacture of sophisticated high-production types of machines. This will inevitably leave a gap for the simpler, general purpose, low-priced machine tools which cannot be economically produced by West Germany.

11) As regards the marketing system for machine tools in Germany, 60% of domestically manufactured machines are sold directly by the manufacturers to the customers. Sales through distributors and agents account for 30% and 10% respectively. The former buy the machines on their own account and sell them at prices which they fix on the basis of the competitive market position. The latter act as intermediaries and work on the basis of commissions ranging from 7% to 15% depending on the type of product and the manufacturer.

12) Imported machine tools are sold mostly through agents or distributor-cum-agents since their local contacts are invaluable to an unknown manufacturer attempting to enter a foreign market.

13) Machine tool users regard the purchase of investment goods like machine tools as a transaction which requires a tremendous amount of knowledge about, and confidence in, the seller.

Because of this factor of confidence, German machine tool users have standing lists of machine tool suppliers, who have been supplying them for a number of years. The first and foremost criterion for purchase of a machine tool by a user is not price, but quality followed by after-sale service and other presale engineering facilities.

14) There is total ignorance of Indian engineering products in general, and machine tools in particular, among users and distributors/agents in Germany. Further, there are also doubts on the quality and performance of Indian machine tools and the user does not have the "confidence" that is an essential pre-requisite for the purchase of capital goods like machine tools.

15) The few tools that have been exported to Germany have aroused complaints from the users, not so much on the technical features as on the non-technical aspects like finish and workmanship. There have been complaints about rusting, bad painting and poor workmanship by recent purchasers of Indian machine tools.

16) West Germany is a highly export-oriented country and exports over half of her domestic production of machine tools. She exports to practically every country in the world.

11.2 Recommendations

1) The technological developments as well as the movement of cost structures, particularly labour costs, in West Germany are shifting domestic production towards more sophisticated machine tools. This opens scope for lower-priced, standard general purpose machines from other countries like India who have a comparative advantage in this product group. It is estimated that this sector accounts for about 40% of Germany's current total imports.

2) However, India will have to face stiff competition from supplying countries neighbouring to Germany like Italy and Spain who enjoy the same comparative advantage as India in the simpler, low-priced machines, but who are not handicapped as India is by trade barriers or distance. Due to the latter, India cannot offer as fast supply and service facilities as Italy or Spain so that even if Indian machine tools were somewhat lower in price, they would have to contend with this factor.

3) On the other hand, the size of the machine tool market as well as environmental conditions make West Germany a very attractive first priority market for Indian exporters, provided the required lines of action on product as well as market development are undertaken.

According to an influential German official, who is very well acquainted with Indian conditions, the first recommendation to India machine tool manufacturers in that they should become "export oriented" in the true sense of the term. This really implies that Indian manufacturers should be responsive to the needs of the market, particularly in terms of technical adaptation of the product to suit users' requirements.

Even in a routine matter like responding to enquiries promptly German parties were unhappy with the delays at the Indian end.

Further, in non-technical aspects like packaging, finish and workmanship, Indian machines must improve in order to be competitive with the products of other supplier-countries.

Strict quality control is required to ensure the quality of Indian machines in order to sustain the image of quality that will have to be developed in the first instance among German users.

4) Some Indian machine tool manufacturers, at least, may consider forming an Export House or consortium on the same lines as the German enterprise in Hamburg. This consortium could establish regional offices in important regions of the world, with one, for instance, in West Germany to cover all ECM countries.

The functions of this organisation may be the following:

In India:

(a) Strict quality control of products of member firms.

(b) Control of design, production and inspection facilities of member firms.

(c) Advice and consultancy in matter of design and production to member firms in the context of foreign users' requirements.

(d) Dissemination of technical and commercial information received from overseas offices on a regular basis.

(e) Liaison with Government authorities for representing the interests of the member-firms.

In Germany:

(a) Appointing and controlling the activities of distributors.

(b) Maintaining liaison with German authorities, custom officials etc.

(c) Conducting regular surveys on product, competition, technology, marketing and economic trends and developments in Germany.

(d) Feed-back of this information to the home office on a regular basis e.g. monthly.

(e) Taking part in local tenders, etc.

(f) Active and intensive sales promotion and public relations through: personal contacts with major users and distributors; holding regular demonstration of Indian machine tools; running a show room with latest models of machine tools; issuing pamphlets, brochures and catalogues in the German language; running regular advertising campaign in German journals, technical magazines and other media; arranging participation of member-firms in fairs and exhibitions; arranging orientation trips of distributors to India; follow-up on users of Indian machine tools; stocking of spare parts of machine tools sold; catering to serious complaints and breakdowns which distributors cannot handle; and, arranging financing facilities with local banks for the benefit of users.

The German Office of this export organisation would be best located in Dusseldorf (in the province of North Rhine Westphalia, the heart of German industry). Besides being able to cover the biggest users easily from here, Humburg and Bremen are also within quick reach for taking care of shipments etc. Bonn and Frankfurt are also near in order to reach Associations and Government authorities.

Common Market countries like France and Benelaux could also be reached quickly from Dusseldorf.

An attempt has been made to estimate the monthly running cost of such an office for the Indian Industry in Germany, just to point out the feasibility of such a venture, as given in Table 16 below:

Table 16

Estimated Monthly Cost of Export Office in West Germany (1)

Running Monthly Expenditure

1.	Rent of office plus attached showroom of size 150-175 sq. metres ..	$ 1,750
2.	Salaries of 2 clerical staff $ 1500 each	$ 300
3.	Running office expenses like stationery, postage, telephone etc.	$ 750
4.	Travelling expenses for average 10 days a month	$ 750
5.	Salary for Manager	$ 500
6.	Other overheads	$ 500
	Total	$ 4,550

(1) This cost plan has been made according to current costs in Germany, vide Frankfurter Allgemeine Zeitung, Frankfurt of 31.8.1968.

Initial Fixed Expenditures

1.	Car	$ 1,750
2.	Office equipment	$ 2,000
		$ 3,750

Total running expenditure per annum would thus amount to $ 54,600 plus the initial expenditure of $ 3,750.

The manager to be employed should be thoroughly familiar with the German economy and industry and should have lived there for several years and, of course, should speak German fluently; he should basically be an engineer with professional experience in machine tools sales and servicing.

It is essential that a "marketing outpost" of the type recommended be created to keep very close touch with the market through field surveys.

5) A massive publicity campaign on India's technical progress is necessary to build an image of India as a quality supplier of Indian machine tools.

This should be followed in the second phase by a promotional campaign of those machine tools which are of exportable standard. Press advertising in trade journals and exhibition at fairs would be most suitable for this purpose. The purpose of this campaign would be not selling but acquainting prospective buyers with Indian machine tools. Trade journals like the "Ubersee-Post" having world wide circulation and which is printed in various European languages would be most suited to this purpose. This journal, for instance, should also be made to bring out technical write-ups and articles on selected Indian machine tools. Participation in the Hanover fair is strongly recommended.

The final stage for the purpose of actual selling would be promotional activity on individual machine tools. Here the media used would primarily be the sophisticated technical journals like "Werkstatt and Betrieb" catering to purely technical audience.

It is realised that this involves a substantial expenditure in foreign exchange, which immediately sets constraints to such a project. However, it is again felt that long-term promotional activities on the lines indicated together with the establishment of a local office in Germany by Indian exporters would be the only way to usher in on a long-term basis the export of Indian machine tools to Germany.

Appendix - 1

Turnover and Employment of Major Metal Working Industries in West Germany, 1964

Type of Industry		Turnover (Million US $)	Employment ('000 persons)
Machinery Building	..	9,004	1,061
Electrical	..	7,063	934
Vehicle	..	6,308	487
Other Metal Working	..	3,406	418
Steel Construction	..	1,791	223
Nonferrous Metal	..	1,453	85
Steel Working	..	1,308	150
Ship Building	..	596	72

Source: VDMA, Statistisches Handbuch, Frankfurt, 1965

Appendix - 2

Index of Production of West German Metal Working Industries, 1960-65

(Year 1958 = 100)

Industry	1960	1961	1962	1963	1964	1965
Iron Making	129	127	124	119	142	144
Iron Forging	121	122	116	110	124	131
Non-ferrous Metal	126	128	124	129	127	157
Drawing and Rolling	128	133	122	121	127	128
Steel Forming	123	130	122	120	134	154
Steel Construction	105	117	119	120	125	121
Machinery	120	131	133	129	138	154
Vehicle	141	148	161	182	194	214
Ship Building	94	94	92	85	89	88
Electrical	131	146	149	152	120	195
Precision Machinery	121	124	124	124	142	156
Other Metal Working	129	136	140	144	161	174
Total Metal Working Industry	122	128	127	122	139	151

Source: VDMA, ibid, p. 112

Appendix - 3

Investments in Major Metal Working Industries in West Germany, 1962-64

Industry	1962			1963			1964		
	Invest-ment Mill $	% change over previous year	% of Sales	Invest-ment Mill $	% change over previous year	% of Sales	Invest-ment Mill $	% change over previous year	% of Sales
All Industrial Goods ..	1,800	+ 2	6.9	1,442	-19	5.3	1,562	+ 9	5.3
Steel construction ..	74	+15	4.7	57	- 23	3.1	60	+ 6	3.2
Machinery Building ..	456	-9	5.8	390	- 15	4.9	395	+ 1	4.6
Vehicle ..	571	+10	10.9	370	- 35	6.6	500	+34	8.0
Ship Building..	22	Neg	Neg	20	-13	Neg	29	+49	Neg
Electrical ..	420	+3	6.5	353	-12	5.4	336	- 5	4.7
Precision mechanical ..	50	+16	6.6	49	- 2	6.2	46	- 2	5.3
Steel working..	62	-10	5.8	53	-15	4.9	56	+ 5	4.5
Sheet metal, Iron working ..	145	+ 5	5.1	150	+ 3	5.1	150	-	4.5

Source: IFO - Institute, Munich

Appendix - 4

Breakdown of Investment in West German Metal Working Industries for Building Construction and Equipment, 1962-64

(% of total investment)

Industry	Building Construction			Equipment		
	1962	1963	1964	1962	1963	1964
Steel Construction	32	17	26	68	83	74
Machinery Building	31	25	27	69	75	73
Vehicles	26	30	32	74	70	68
Ship Building	36	32	29	64	68	71
Electrical Industry	31	26	26	69	74	74
Precision Mechanical	35	33	24	65	67	76
Steel Working	20	15	13	80	85	87
Sheet Metal, Iron Working	26	26	23	74	74	77
Total Industrial Goods	28	26	27	72	74	73

Source: IFO, ibid

Appendix - 5

Purpose of Investment by West German Metal Working Industries, 1962-64

(% of Companies asked)

Industry	Purpose of Investment								
	Expansion			Rationalisation			Replacement		
	1962	1963	1964	1962	1963	1964	1962	1963	1964
Steel Construction	35	3	6	41	56	60	24	41	34
Machinery Building	46	32	29	36	49	49	18	19	22
Vehicles	38	49	54	62	50	44	-	1	2
Ship Building	21	45	29	76	42	56	3	13	15
Electrical	50	26	32	48	69	65	2	5	3
Precision Mechanical	10	8	22	70	83	62	20	9	16
Steel Working	11	11	18	75	55	60	14	34	23
Sheet Metal, Iron Working	20	23	24	62	71	71	18	6	5
Total Industrial Goods	39	31	36	52	58	54	9	11	10

Source: IFO, ibid.

Appendix - 6

Reasons for Investment* Given by West German Metal Working Industries, 1962-64

(% of Companies asked)

Industry	Shortage of Labour			Change of Products			New Production Method		
	1962	1963	1964	1962	1963	1964	1962	1963	1964
Steel Construction	53	67	51	47	10	28	18	15	13
Machinery Building	51	53	51	57	63	53	33	34	37
Vehicles	67	61	50	95	78	80	36	82	87
Ship Building	49	71	51	3	29	19	24	35	26
Electrical	67	68	74	66	74	78	40	69	72
Precision Mechanical	65	60	47	40	38	49	31	49	41
Steel Working	65	57	71	23	24	32	28	22	39
Total Industrial Goods	62	62	58	66	61	63	34	53	58

Source: IFO, ibid.

* Please note that companies may have more than one reason for investment. The reasons are, therefore, not mutually exclusive.

Appendix - 7

Total Capacity Increase in Production of West German Metal Working Industries, 1962-64

Industry	Percentage Increase in Capacity		
	1962	1963	1964
Total Industrial Goods	9.2	6.3	8.6
Steel Construction	4.1	2.4	6.7
Machinery Building	7.2	4.1	7.9
Vehicles	6.4	8.5	9.5
Ship Building	1.8	0.5	0.9
Electrical	7.6	8.9	9.1
Precision Mechanical	7.4	4.7	7.4
Steel Working	5.3	5.0	9.5
Sheet Metal, Iron Working	11.3	6.8	10.1

Source: IFO, ibid

Appendix - 8

Labour and Productivity in the West German Economy, 1962-65

	1962	1963	1964	1965
Average hourly wages (in $)	0.88	0.94	1.03	1.15
Share of wages (% of Gross Sales)	22.4	24.7	25.5	29.4
Change in % of Wage Share		+2.3	+0.8	+3.9
Total number employed in industries (in millions)	26.9	25.7	26.7	27.5
Total hours worked (in millions)	1338	1456	1504	1500
Price index of industrial goods	100	101	104	105
Gross sale per employee ($)	6560	6930	7380	7650
Productivity index 1958 = 100	136.3	137.4	156	183

Note: 420,000 foreign workers are employed in the machinery industry, two-thirds of the total of all emigrants employed in Germany.

Source: Foreign Market Survey, U.S. Dept. of Commerce, April 1966.

Appendix - 9

Geographical Distribution of West Germany's Industries, 1964

Region	All Industries		Machinery Industry	
	Turnover (Mill.US $)	Employment ('000 persons)	Turnover (Mill.US $)	Employment ('000 persons)
Schleisweig-Holstein	2,034	175	579	26
Hamburg	3,759	220	231	29
Lower Saxony	8,762	748	603	82
Bremen	1,294	98	76	13
North Rhine Westphalia	30,822	2,805	3,070	326
Hesse	6,941	702	780	96
Rhineland Platine	3,910	371	278	39
Baden-Wurthenberg	14,100	1,472	2,159	246
Bavaria	11,569	1,301	1,246	155
Saarland	1,352	169	83	12
Berlin	2,655	287	271	39
Total	87,198	8,348	9,376	1,063

Source: VDMA, ibid.

Appendix - 10

A Brief Overview of Major Machine Tool Using Industries in West Germany

1. Automotive Industry

Following a slight dip in the automotive boom, the industry has continued to expand since 1965. There were 681 companies making automobiles or parts in 1964, showing a decrease from 1962 when they numbered 711. Gross sales increased, however, from 5.2 billion dollars to 6.3 billion dollars. From 1962 to 1964, wages and salaries increased from 940 million to 1190 million dollars. Earnings per employee increased during this time from 4600 dollars to 5600 dollars. In spite of this, the percentage of wages of gross sales increased also from 18.1 to 19.1% during the last two years. From 1962 to 1965, average hourly wages per employee increased from 0.99 dollar to 1.23 dollar. Wages are thus increasing faster than productivity.

Rationalisation, mechanisation and automation were carried forward in the automotive industry as in no other industry in Germany. The above figures suggest that this was still not enough to offset the wage increases. Wages increased last year by 3.3% and pressure is building toward further wage raises. Higher prices have been announced.

German and American companies in Germany have very large expansion and modernization plans with substantial capital investments. The German automobile industry is the one group of large industrial enterprises which, in its nature and market size, offers great opportunities for sophisticated machine tools of the type produced by U.S. and Switzerland.

Large Projects: Ford has a new factory project in Saarlouis. Opel, large expansion projects in Kaisers-lautern and Bochum. Volkswagen will build a research and development center in Wolfsburg, plus it will expand the plants in Emden and Ingolstadt. Total capital investment of the automotive industry was 580 million dollars in 1965. Considering only the four largest companies - Volkswagen, Dainler-Mercedes, Open and Ford - their average outlay for machine tools will be approximately 100 million dollars per year, during the next 5-7 years. Capital investment of the entire automobile industry for equipment should be approximately 380 million dollars per year. One of the large American automobile companies estimated its yearly machine tool purchases from the USA at approximately 5 million dollars and its purchases from American companies in Europe at 3.4 million dollars.

2. Iron and Steel Working Industry

Total sales of the industry: 3.5 billion dollars in 1964, a 14.4% increase from 1963

Of this, for example:

Sheet metal work	$ 0.9 billion,	7.9% increase
Locks and Hardware	$ 0.32 " ,	18.2% "
Hardware for the automobile industry	$ 0.2 " ,	16% "
Arms and ammunition	$ 0.4 " ,	-18% "
Hand tools	$ 0.25 " ,	11% "

Employees: 412,000, or 4.5%, up from the previous year.

The amount of wages increased by 14.1% and salaries by 10.4%. The industry considers the most important goal to be the rationalisation or increase of productivity. In spite of a substantial increase in sales volume, profits increased very marginally - only 3% - since price competition, especially on the export market, was very keen. Some of the export sales took place at cost.

The majority of the companies in this sector buy as close to home as possible. There is good market potential for equipment for new technology (fast presses, high rate forming, electrolytic die making).

Source of statistics: GFK Institute, Nurnberg,
Rheinsinsch-Westfalisches Institut
fur Wirtschaftsforschung.

3. Electrical Industry

Yearly sales were: $ 4.5 billion in 1964, an increase of 9.2% from 1963

Some important items:

Power generating equipment	$ 0.6 billion,	6% increase
Power distribution equipment	$ 0.8 " ,	20% increase
Home appliances	$ 0.8 " ,	12% increase

The labour market is the biggest problem of the industry, and rationalisation is the only way out of this bottleneck. An easing of the labour market cannot be expected. In 1965 rationalisation (i.e., increase of productivity) was the reason for 65% of all investment, while 74% of all investment was for equipment.

Investment in machinery was expected to be approximately 400 million dollars for 1966. One of the largest manufacturers (Siemens) expects to buy 750,000 dollars worth of machine tools from the U.S.A.

Data: GFK Institute, Nurnberg.

4. Machinery Industry

The total production of the machinery industry was approximately 9 billion dollars in 1965 (including machine tools). The production decreased somewhat toward the end of the year. In 1966 capital investment continued to be scarce. Domestic consumption is not expected to reach the same growth rate as in the previous years. Export orders during the first months of 1966 were higher than in the same months of 1965 but they are not compensating fully for the slackening domestic business.

Productivity maintained the favourable growth rate of approximately 7% during the previous years. Wages, nevertheless, rose faster than productivity. The first problem of the industry remains the improvement of productivity through mechanisation and automation. According to Professor Dolezalek of the Institute of Technology Stuttgart, there is infinite room for further increase of efficiency and labour saving and economy.

Three quarters of the capital investment or about 250 million dollars will be invested in equipment.

Source: VDMA Frankfurt

Appendix - 11

Annual Purchases of Machine Tools by Types in West Germany, 1961-1964

(Values in US $)

	1961	% of Total	1962	% of Total	1963	% of Total	1964	% of Total
1. Planing and shaping	11,033	2.5	9,707	1.9	12,346	2.9	10,262	2.3
2. Lathes and threading	62,607	14.0	70,896	13.5	51,368	12.1	50,378	11.1
3. Turret lathes and automats	43,901	9.9	42,447	8.1	32,149	7.6	32,322	7.1
4. Drilling and tapping	25,163	5.6	28,978	5.5	21,879	5.2	24,627	5.4
5. Milling and horizontal boring	34,100	7.7	46,511	8.9	44,722	10.6	50,077	11.0
6. Sawing and filing	7,949	1.8	9,324	1.8	7,162	1.7	13,648	1.9
7. Grinding, honing and polishing	41,644	9.3	51,551	9.8	39,876	9.4	48,597	10.7
8. Gear cutting	10,845	2.4	12,254	2.3	28,461	6.7	12,587	2.8
9. Other special machines for clip removal	17,207	3.9	37,459	7.2	17,252	4.1	22,751	5.0
10. Accessories and parts for 1-9	38,432	8.6	44,676	8.5	44,973	10.5	50,307	11.1
11. Forging, bending, straightening	11,908	2.7	15,874	3.0	15,129	3.6	12,275	2.7
12. Mechanical presses	58,137	13.0	71,304	13.6	36,477	8.6	45,921	10.1
13. Hydraulic presses	19,927	4.5	22,165	4.2	19,686	4.6	23,861	5.2
14. Sheet metal working	15,163	3.4	17,450	3.3	15,081	3.6	20,092	4.4
15. Wire producing	19,122	4.2	19,535	3.7	18,044	4.3	21,689	4.8
16. Special screw machines	9,447	2.2	6,861	1.3	6,530	1.5	7,231	1.6
17. Accessories and parts for 11-16	19,220	4.3	17,299	3.4	12,307	2.9	13,349	2.9
Total machine tools	445,805	100.0	524,291	100.0	423,442	100.0	459,974	100.0

Source: VDMA, ibid, p.139.

Note: The total purchases of machine tools do not exactly tally with the total consumption of machine tools as estimated in Table 13. The slight discrepancies are due to the fact that the latter does not take into account stock changes from year to year.

Appendix - 12

Production of Machine Tools by Types in West Germany, 1961-64

(Million US $)

	1961	1962	1963	1964
Metal Cutting Machines:				
1. Machines for planing, shaping, breaching	20.5	20.8	22.0	19.5
2. Lathes, cutting & threading	88.3	99.9	87.0	77.3
3. Turret lathes & automats	55.7	65.3	58.0	56.5
4. Drilling and tapping	35.3	41.5	36.0	39.6
5. Milling and horizontal boring and milling	62.1	74.7	83.9	82.2
6. Sawing and filing	14.7	17.5	15.8	17.8
7. Grinding, honing and polishing	75.3	88.2	84.7	92.3
8. Gear cutting	24.0	26.5	26.4	26.9
9. Other special machines for chip removal	33.4	42.3	31.8	41.8
10. Accessories, parts & spares for 1-9 machines	46.9	54.6	56.9	62.8
11. Total metal cutting	456.2	531.3	502.5	516.7
12. Forging and auxiliary equipment: Rivetting, bending, straightening, drawing	21.5	24.8	25.8	23.5
13. Mechanically activ. presses for metal-working	68.4	86.5	60.2	62.6
14. Hydraulic presses for metal-working	30.9	31.9	33.5	34.6
15. Sheet metal working machines	34.9	36.6	37.8	40.9
16. Wire producing and forming machines	36.8	39.8	39.7	42.2
17. Special screw machines (Chipless and chip remov.)	13.3	13.6	15.0	17.2
18. Accessories, parts and spares for 12-17	24.1	24.3	20.6	25.7
19. Total metal forming	229.9	257.5	232.6	246.7
20. Total machine tools	686.1	788.8	735.1	763.4

Source: VDMA, ibid.

Appendix - 13

Value of Production Per Ton by Types of Machine Tools in West Germany - 1964

Type of Machine	Tons	Million U.S. $	Value Per Ton in US $
Planning, Shaping	9,874	19.5	1,980
Lathes	29,557	77.3	2,607
Automatic & Turrets	14,683	56.5	3,850
Boring	14,327	39.6	2,762
Milling	28,540	82.2	2,880
Hacksaw & Filling	8,652	17.8	2,057
Grinding, Honing	28,293	92.3	3,270
Gear cutting	6,907	26.9	4,010
Other metal cutting	9,269	41.8	4,515
Accessories etc	22,439	62.8	2,774
Total Metal cutting	172,541	516.7	2,995
Forging and auxiliary equipment	11,280	23.5	2,072
Mech Presses	42,452	62.6	1,476
Hydraulic Presses	27,461	34.6	1,256
Sheet working	22,745	40.9	1,802
Wire producing	13,157	42.2	3,204
Screw making	4,286	17.2	4,003
Accessories etc for metal forming	13,640	25.7	1,882
Total Metal Forms	135,021	246.7	1,826
TOTAL MACHINE TOOLS	307,562	763.4	2,481

Source: VDMA, ibid, p. 139

Appendix - 14

Geographical Distribution of Machine Tool Manufacturing Firms in West Germany, 1963

Province	Number of Firms
Schleswig Holstein	2
Bremen	1
Saarland	1
Hamburg	12
Bavaria	34
Baden Wurttenberg	111
North Rhine Westfalia	124
Hessen	42
Lower Saxony	16
Rhineland-Palatine	13
Berlin	18
Total	374*

Source: Compiled from Werkzeugmaschinen, VDW, Frankfurt, 1964.

* The number of firms as reported by the VDW in 1963 as compared to the number of 460 as reported in the Foreign Market Survey Report of the U.S. Dept. of Commerce in April 1966.

Appendix - 15

Cost Structure of West German Machinery Industry by Size of Firm, 1962

Categories	Percentage of Total Production Cost Size of firm according to Total Production (Mill.DM) <1	1 - 2	2 - 5	5 - 10	10 - 25	25 - 50	>50
Direct material consumption	31.1	33.3	36.1	39.3	41.3	41.7	47.8
Indirect material	1.8	1.5	1.6	1.5	1.6	1.6	1.7
Total personnel of which:	37.2	34.3	34.2	32.1	30.7	31.1	30.2
Workers	24.1	21.2	20.1	18.1	17.2	17.3	16.3
Staff	8.6	8.5	9.5	9.4	9.3	9.5	9.4
Social costs:							
Compulsory	4.0	3.5	3.5	3.2	3.0	3.0	2.9
Others	0.5	1.1	1.1	1.4	1.2	1.3	1.6
Maintenance	0.9	0.8	0.8	0.9	0.9	0.8	1.0
Taxes	4.5	4.6	4.4	4.3	4.2	4.0	3.7
Rents	1.0	0.6	0.4	0.7	0.3	0.4	0.4
Other costs	6.9	7.7	8.5	7.8	7.7	7.9	6.0
Other Costs	16.6	17.2	14.0	13.4	15.3	12.5	9.2
Total Production Cost	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: VDMA, ibid

Appendix - 16

Names of German N/C Machine Tool Manufacturers

Manufacturer	Type of Machine	Control made by
Reinhard Bohle KG Werkzeugmaschinenfabrik 4801 Jollenbeck, Horstheiderweg 40	Plano milling	
Burkhardt GmbH 7417 Pfullingen/Wurtt Klosterstr	Jig boring	Sperry
Burkhardt & Weber KG Werkzeugmaschinenfabrik 741 Reutlingen/Wurtt St. Peterstr. 53	Universal milling with automatic tool changer	Hughes
Collect & Engelhard Maschinenfabrik GmbH 605 Offenbach/Main Bernardstr 130	Milling-boring	Siemens
O. Dorries AG 561 Duren/Rhld Veldener Str. 52	Vertical turning, boring	AEG
Droop & Rein Werkzeugmaschinenfabrik 48 Bielefeld Schildescherstr. 5	Vertical milling	Ferranti
Ex-Cell-O GmbH (American) 7332 Eislingen/Fils Salacherstr. 93	Boring with aut. tool changer	GE
Fortuna Werke, Stuttgart	Cylindrical grinding	
Gebr. Heller Maschinenfabrik GmbH 744 Nurtingen/Wurtt. Neuffener Str. 54	Horizontal boring milling	Ferranti Heller

Appendix 16 (continued)

Manufacturer	Type of Machine	Control made by
Hessapp Hessische Apparatebau GmbH Werkzeugmaschinenf 6206 mahn u. Wiesbaden Aarstr./Taunusstr	Lathe	BBC
Heyligenstanedt & Co, GmbH Werkzeugmaschinenfabr 63 Giessen Aulweg 39-47	Copying lathe	AEG
Karl Huller Gmbh 714 Ludwigsburg Gronerstr. 7	Lathe	AEG
Jung, Jungenthal Arn. Jung GmbH Abt. Werkzeugmaschinenbau 5242 Kirchen/Sieg	Lathe	Heller
Kollmann Maschinenbau GmbH 5602 Langenberg/Rhld Heegerstr. 20	Planer-milling	SEL
Hermann Kolb Maschinenfabrik 5 Koln-Ehrenfeld Hospelstr. 41	Jig boring	Ferranti Grundig
Fritz Kopp Maschinenfabrik GmbH 791 Neu-Ulm/Donau Turmstr. 61	Vertical milling	Olivetti
Ludwig Loewe &Co AG 1 Berlin 21 Huttenstr. 17-20	Knee type vertical milling	AEG
Max Muller Brinker Maschinenfabrik 3 Hannover Max Muller Str. 4	Facing lathe	AEG

Manufacturer	Type of Machine	Control made by
Nagel, Maschinen u. Werk-Zeugfabrik Gmbh 744 Nurtingen/Wurtt Oberboihinger Str	Boring and milling	AEG
Nassovia Werkzeugmaschinenfabrik GmbH Langen/Hessen, 607 Nassoviastre. 1		
Naxos Union, Schleifmittel u. Schleifmaschinenfabrik 6 Frankfurt/Main Wittelsbacher Allee 29	Roller grinding boring and milling	AEG Gidding & Lewis
Pittler Maschinenfabrik AG 607 Langen/Hessen Pittlerstr	Turret lathe	Siemens
Maschinenfabrik Ravensburg AG 798 Ravensburg/Wurtt. Georgstr. 24	Copying lathe, Facing lathe	
Rheinmetall GmbH 4 Dusseldorf 3 Ulmenstr. 125	Deep hole boring	Rheinmetal
Scharmann & Co Spezialfabrik f. Waagerecht-Bohr-und Fraswerke 407 Rheydt/Rhld Hugo Junkers Str. 12-32	Horizontal boring	AEG, GE, Philips
Schiess AG 4 Dusseldorf-Oberkassel Hansa Allee 245	Vertical turning, horizontal boring	Schiess, AG, BBC
Bernhard Steinel Werkzeugmaschinenfabrik 722 Schwenningen/Neckar Rathausstr. 1	Knee type vertical milling	AEG

Appendix 16 (continued)

Manufacturer	Type of Machine	Control made by
UMA Werke, Karl Muller & Sohne KG, Werkzeugmaschinenf. 7336 Uhingen/Wurtt Stuttgarter Str 100	Horizontal boring milling	AEG
VWF, Vereinigte Werkzeugmaschinenfabriken AG 6 Frankfurt/Main Kleyerstr. 45	Horizontal boring, milling	AEG, BBC, Grundig
Wagner & Co. Werkzeugma schinenfabrik GmbH 46 Dortmund Dortmunder Feld 2	Heavy facing	AEG, Wagner
Waldrich-Coburg Werkzeugmaschinenfabrik Adolf Waldrich,Coburg 863 Coburg/Bayern Hahnweg 116	Planing plano-milling	Ferranti
Waldrich, Siegen H.A. Waldrich GmbH Grosswerkzeugmaschinen 59 Siegen/Westf St. Johannstr. 37	Roll grinding	AEG, GE
Wanderer Werke AG 8013 Haar b. Munchen Grondorfer Str. 9	Knee type milling	Wanderer
Werner Berlin Fritz Werner AG maschinen u. Werkzeugfabr. 1 Berlin 48 Fritz Werner Str.	Knee type milling	AEG, BBC
H. Wohlenberg KG 3012 Langenhagen-Havvover Wohlenbergstr. 6-8	Lathe	Wohlenberg
Wotan-Werke GmbH Werkzeugmaschinenfabrik 4 Dusseldorf Reisholzer Werftstr. 76	Horizontal boring, milling, internal grinding	AEG, Grunding Ferranti, Philips

Source: Report on Advanced Metal working Machines published by U.S.
Dept. of Commerce, p 43

Appendix - 17

Imports of Machine Tools by Types into West Germany, 1964

Type	Value		Weight	Value per ton
	(Mill US $)	(%)	(Tonnes)	(US $)
Planing, shaping & broaching	1.54	2.0	1,290	1,200
Lathes - cutting & threading	7.78	10.2	3,702	2,000
Automats & turrets	5.59	7.2	1,376	4,100
Drilling & tapping	5.57	7.2	1,879	2,900
Milling & horizontal boring and milling	10.50	13.7	4,353	2,400
Sawing & filing	0.71	0.9	281	2,500
Grinding, honing & polishing	11.20	14.6	2,858	3,900
Gear cutting	4.20	5.5	902	4,600
Other metal cutting	1.28	1.7	225	5,700
Accessories etc.	5.00	6.5	2,124	2,300
Forging & auxiliary equipment	2.29	3.0	851	9,600
Mechanical presses	5.20	6.6	4,532	100
Hydraulic presses	2.19	2.9	1,304	1,600
Sheet working	3.41	4.5	1,548	2,200
Wire working	4.60	6.0	1,100	4,100
Screw making	1.10	1.5	228	4,800
Other metalforming	0.58	0.8	139	4,100
Scrap briquetting presses	0.91	1.2	437	2,100
Accessories etc	3.00	4.0	2,645	1,100
TOTAL MACHINE TOOLS	76.82	100.0	31,875	2,400

Source: VDMA, ibid, p. 149

Appendix - 18

Value of Import of Machine Tools into West Germany
(Values in Thousand Dollars)

Types of Machine	1961	1962	1963	1964	1965
Planing, Shaping & Broaching	1,779	1,686	963	1,539	1,492
Lathes	14,340	13,428	6,993	7,767	9,526
Turrent & Automatic Lathes	11,250	9,205	4,782	5,580	7,031
Drilling & Tapping Machines	8,241	6,507	4,692	5,567	8,082
Milling - Horizontal and Boring	11,207	16,822	10,177	10,484	10,000
Sawing & Filling Machines	921	747	640	713	943
Grinding, Polishing and Lapping Machine	15,148	16,038	9,789	11,190	15,363
Gear Cutting Machine	4,992	6,762	4,394	4,196	6,105
Other Machines for the Removal of Chips	3,082	10,822	1,004	1,282	3,238
Forging and other Auxiliary Equipment	1,782	3,724	1,866	2,292	2,829
Mechanical - Presses	4,872	6,312	5,332	5,193	4,396
Hydraulic - Presses	2,017	3,548	1,625	2,195	2,763
Shears and Punching Machines	2,968	3,230	2,532	3,406	4,236
Wire-working machines	3,976	3,923	3,229	4,600	4,382
Fabricating Machines for Bolts & Nuts	3,055	2,047	1,421	1,107	1,581
Presses for Scraps	1,158	1,203	1,089	909	2,014
Other Metal Forming Machines	473	658	476	578	1,434
Total	91,264	106,662	60,993	68,599	83,602

Source: Trade Statistics Collated by UCIMU, the Italian Machine Tool Manufacturers' Association.

Note: There are discrepancies in the dataon total imports by value as given above and the data of Table 18 in Section 7.1.

Appendix - 19

Imports of Machine Tools by Types and According to Country of Origin, 1964

(Values in US $)

Country of origin	Total of Metal Cutting & Metal Forming Machines	Planer & Shapers	Lathes - Cutting & Threading	Turret & Automatic Lathes	Drilling & Tapping	Milling Machines	Sawing and Filing	Grinding, Honing & Polishing	Gear Cutting Machines	Other Metal Cutting Machines	Accessories & Spare Parts
	Mill. US $	METAL CUTTING (in '000 US $)									
France	6.06	24	738	595	201	983	141	126	206	21	335
Belgium-Luxemburg	5.02	64	597	2	64	1,256	8	485	9	-	371
Netherlands	4.16	24	289	35	109	272	21	467	4	153	304
Italy	3.55	118	589	110	377	412	104	513	67	69	109
U.K.	8.45	49	604	453	202	865	39	1,050	229	109	325
Norway	0.02	-	9	-	-	-	3	16	-	-	12
Sweden	2.80	60	39	68	128	70	32	1,490	1	-	293
Denmark	0.27	3	92	17	32	27	2	170	7	2	19
Switzerland	20.07	112	1,850	2,910	2,430	2,690	80	2,810	1,760	645	1,600
Austria	2.97	16	508	55	323	237	53	235	5	6	180
Spain	1.06	79	140	70	8	264	1	103	5	-	340
Yugoslavia	0.17	2	2	-	-	93	-	3	53	-	6
USSR	0.09	40	570	24	115	162	10	38	-	-	-
Poland	0.18	11	71	-	6	65	11	4	-	-	2
Czechoslovakia	2.04	215	346	26	165	952	6	216	30	-	40
Hungary	0.07	35	287	13	137	197	-	19	12	-	2
USA	17.16	677	785	1,200	131	1,860	196	3,230	1,790	273	1,040
Japan	0.02	-	172	-	1	38	-	6	14	-	5
Other countries	0.02	5	88	2	2	34	1	7	-	-	10
Total	76.82	1,540	7,780	5,390	5,570	10,500	714	11,200	4,200	1,280	5,000
Total weight in Tons	31,875	1,290	3,802	1,376	1,879	4,353	281	2,858	902	225	2,124

N.B. There may be slight discrepancies in the column total figures due to rounding off errors in the process of conversion from the original data in DM currency to US $.

Appendix 19 (cont'd)

Imports of Machine Tools by Types and According to Country of Origin, 1964

Country of origin	Forging & Auxiliary Equipment	Mechanical Presses	Hydraulic Presses	Sheet working	Wire working	Screw making	Other metal forming	Scrap briquetting Presses	Spare Parts and Accessories
	METAL FORMING (in '000 US $)								
France	229	269	278	622	375	81	75	44	355
Belgium-Luxemburg	83	89	154	110	810	108	14	87	726
Netherlands	138	1,340	122	316	82	61	67	158	182
Italy	35	97	116	146	305	184	40	47	104
U.K.	666	2,210	158	650	388	169	9	130	135
Norway	-	-	-	-	166	-	-	-	32
Sweden	24	27	57	100	57	255	9	24	60
Denmark	80	1	115	41	25	-	25	5	9
Switzerland	324	787	488	124	707	98	82	106	337
Austria	339	12	77	122	333	21	24	103	312
Spain	5	32	5	-	4	-	3	-	-
Yugoslavia	-	-	-	-	-	-	-	-	5
USSR	-	-	-	3	-	-	-	-	-
Poland	-	-	-	6	-	-	-	-	-
Czechoslovakia	-	11	-	22	3	-	-	-	1
Hungary	-	-	-	-	2	-	-	-	-
USA	336	314	622	1,140	1,000	126	221	200	805
Japan	-	-	-	-	16	-	-	-	-
Other countries	32	6	6	2	70	-	3	2	15
Total	2,290	5,200	2,190	3,410	4,600	1,100	578	910	3,008
Total weight in tons	851	4,532	1,304	1,548	1,100	228	139	437	2,645

N.B. There may be slight discrepancies in the column total figures due to rounding off errors in the process of conversion from the original data in DM currency to US $

Appendix - 20

Import Duties for Machine Tools Applicable to Countries Outside ECM and Concessions According to Kennedy Round

Description of Product	Tariff for countries other than ECM (1.7.1968) %	Concession according to "Kennedy Round" %
Metal Working Machines	10	7
Machine tools for working metal or metallic carbides :		
A) Machines for recycling of irradiated fissile material	11	5,5
B) Machine tools working by electro-erosion	6	3
C) Other machine Tools :		
I) Lathes, Semi-automatic, multi Spindle etc.	8	7
II) Reaming machines	6	3
III) Planing	8	7
IV) Shaping	5	2,5
V) Milling and Drilling	10	8
VI) Sharpening, Grinding, Trimming		
a) Fitted with micrometric adjusting system	8	7
b) Others	3	2,5
VII) Centering Machine	5	2,5
VIII) Gear Cutting Machines		
a) For cutting cylindrical gear	8	7
b) For cutting other gears	5	4,5
IX) Presses	10	8

Appendix 20 (continued)

Description of Product	Tariff for countries other than ECM (1.7.1968) %	Concession according to "Kennedy Round" %
X) Coiling, Bending	6	3
XI) Forging and Stamping	6	3

Source: Relazione Del Presidente Per L'Anno-1967
U.C.I.M.U. pp. 23-24.

Appendix - 21

Selected Well Known and Widely Read Technical Magazines in West Germany

Magazine	Publisher
Industri Angeiger	Girardet Verlag, Essen
Zeitschrift fur Wirtschaftliche Fertigung (ZWF)	Rudolf Haufe Verlag, Freiburg i. Br. Schwarzwaldstr. 15
VDI Zeitschrift	VDI Verlag GmbH, Dusseldorf, Bongardstr. 3
Die Automatisierte Werkzeugmaschine	Karl M. Hagemeier-Verlag, Heidelberg, Blumenthalstr. 40
Deutsche Maschinenwelt	A.M. Schonleitner Verlag, Munchen, J.S. Bachstr. 1
Maschinenmarkt	Vogel Verlag Wurzburg, Max Planck, Str 7/9
Maschine und Werkzeug	I H L Verlag, Coburg, Postfach 683
Werkstattechnik	Springer Verlag, Berline 31, Heidelberger Plate 3
Werkstatt und Betrieb	Carl Hauser Beitschriftenverlag, Munchen Kolberger Str. 22
Technische Rundschau, Hallweg AG	Walter Schmidt AG, Wuppertal-Elberfeld, Postfach 891
Ubersee-Post	Verlag A. Obst 85, Nuremburg 2 Postfach
Export Anteiger	Verlag Herbert Stuningel 2 Hamburg Ballindamm-38.

Export of German Machine Tools by Type and Country, 1964
(in '000 US $)

Country of Destination	Total of metal cutting & metal forming m/c	Planers and shapers	Lathes	Lathes Turret	Boring machine	Milling machine	Sawing & filing	Grinding Honing & Lapping	Gear cutting	Other metal cutting	Spare parts
					METAL CUTTING						
A) Europe	283,375	6,110	24,[illegible]	20,650	13,360	28,640	7,470	38,840	13,190	15,670	12,790
France	48,945	1,470	4,080	4,200	2,370	4,234	1,036	6,830	3,764	1,430	2,270
Belg.-Lux.	17,745	407	1,300	611	33	880	521	1,412	431	1,370	975
Netherlands	16,122	493	2,120	796	88	1,592	641	1,980	143	156	1,040
Italy	35,397	816	2,550	2,240	1,370	3,700	511	4,335	1,020	4,100	1,150
U.K.	38,420	292	2,250	4,040	1,360	4,089	971	4,671	2,170	4,580	1,660
Norway	3,859	52	729	132	218	544	204	280	33	52	190
Sweden	18,886	257	2,110	1,690	1,327	2,154	734	2,003	1,130	802	1,050
Finland	3,339	10	344	168	121	475	144	710	91	17	79
Denmark	6,144	181	1,010	749	226	648	344	496	178	87	252
Switzerland	26,537	745	2,413	1,674	2,275	3,657	931	3,421	370	1,170	2,200
Austria	12,576	276	913	1,352	679	1,800	488	1,934	203	201	560
Portugal	1,856	17	133	311	43	288	76	240	28	15	60
Spain	18,552	516	1,210	1,516	889	1,604	305	2,213	780	936	466
Yugoslovia	6,311	45	[illegible]	681	114	264	51	811	112	358	363
Greece	1,614	35	212	98	37	40	75	232	3	57	73
U.S.S.R.	7,654	6	166	12	39	1,092	14	4,454	1,290	-	55
Turkey	2,135	14	345	34	154	113	63	190	87	2	51
Poland	2,739	16	49	-	28	153	6	436	277	31	18
Czechoslovakia	4,836	274	1,470	44	46	107	254	871	374	-	108
Hungary	2,735	-	484	265	13	473	6	442	332	38	73
Rumania	2,648	158	359	-	61	566	-	425	113	118	55
Bulgaria	627	23	32	15	66	63	5	311	-	-	3

Appendix 22 (continued)

METAL CUTTING (cont'd)

Country of Destination	Total of metal cutting & metal forming m/c	Planers and shapers	Lathes	Lathes Turret	Boring machine	Milling machine	Sawing & filing	Grinding Honing & Lapping	Gear cutting	Other metal cutting	Spare parts
B) Overseas	105,479	4,662	9,604	9,138	7,152	13,980	2,443	10,984	5,448	4,677	4,610
I) Africa	13,553	417	1,330	567	646	1,681	433	1,435	178	296	431
U.A.R.	3,752	105	477	153	444	520	11	511	74	187	70
Libya	201.5	7	45	-	16	13	5	18	-	-	2
Ghana	209	8	21	-	13	11	5	13	-	-	4
Nigeria	295	-	20	-	33	4	11	79	-	-	2
Congo(Leopol-dville)	198	6	11	-	23	7	3	42	-	Neg	13
Kenya	255.2	-	101	-	-	Neg	Neg	13	-	-	3
Republic of South Africa	7,475	249	549	396	85	1,054	345	611	104	90	285
II) North America	21,393	59	1,913	1,167	4,403	2,577	809	2,662	705	90	1,093
U.S.A.	15,364	41	877	1,081	1,757	2,091	583	2,093	690	90	765
Canada	3,919	18	1,286	86	148	489	225	572	14	-	325
III) Latin America	19,209	476	1,690	978	2,109	1,885	253	2,251	810	2,6[illegible]	572
Mexico	3,894	170	553	244	547	674	120	721	40	48	48
Venzuela	1,060	15	150	16	26	32	27	70	-	-	14
Brazil	6,075	157	65	177	896	957	48	516	201	1,802	168
Chile	801.5	49	236	36	27	48	5	26	-	-	16
Argentina	4,405	54	239	443	56	203	1	682	568	709	270
IV) Asia	50,624	3,[illegible]03	[illegible],883	5,266	2,171	6,344	658	8,843	3,501	1,576	2,224
Iran	856	59	13	12	64	124	23	92	-	29	12
Israel	1,340	8	108	69	50	127	111	106	1	56	54
Pakistan	2,521	83	439	165	87	154	16	236	39	1	89
India	12,900	375	146	152	721	2,167	228	1,839	735	916	1,653
Thailand	568	4	155	92	16	47	14	45	2	-	3

Appendix 22 (continued)

Country Destination	Total of metal cutting & metal forming m/c	Planers and shapers	Lathes	Lathes Turret	Boring machine	Milling machine	Sawing & filing	Grinding Honing & Lapping	Gear cutting	Other metal cutting	Spare parts
					METAL CUTTING (cont'd)						
IV) Asia (Cont'd)											
Malaysia	164	-	20	-	1	-	6	40	-	12	1
Indonesia	423	7	124	-	53	30	8	62	9	3	6
Philippines	465	17	68	7	2	26	24	60	-	4	7
China	2,643	12	90	-	238	520	-	896	324	-	49
North Korea	442	-	-	-	401	5	-	-	36	-	-
South Korea	285	28	69	5	20	21	2	92	-	-	3
Japan	22,653	2,866	1,086	3,109	265	2,863	147	5,004	2,335	516	289
Taiwan	143	3	8	36	1	14	-	27	-	1	0.5
Hong Kong	415	3	8	36	1	26	4	130	-	2	4
Australia	7,228	109	725	1,050	267	1,209	252	772	165	64	284
New Zealand	546	3	55	52	5	95	24	35	-	-	22

Appendix 22 (continued)

Country of Destination	Hammer and forging	Mechanical presses	Hydraulic presses	Shears	Wire working machine	Machines for screws, nuts	Other metal forming	Scrap packet machines	Spare parts
				METAL FORMING					
A) Europe ..	10,141	17,632	9,434	18,021	17,920	8,575	768	6,032	12,202
France ..	2,184	3,033	1,214	2,476	3,019	2,257	155	1,064	1,799
Belg.-Lux. ..	4.66	4,379	334	1,191	1,354	109	50	694	1,228
Netherlands ..	455	775	875	2,323	874	127	55	153	1,446
Italy ..	1,637	2,245	1,613	1,731	2,772	1,125	85	569	1,828
U.K. ..	1,184	1,828	416	1,944	2,314	1,348	34	1,588	981
Norway ..	153	278	39	364	270	56	19	123	113
Sweden ..	189	780	543	1,158	1,059	836	21	180	783
Finland ..	167	236	84	200	282	45	20	24	124
Denmark ..	228	169	87	787	274	74	17	83	254
Switzerland ..	735	1,151	789	1,717	1,150	347	49	428	1,108
Austria ..	515	592	271	971	802	272	55	170	502
Portugal ..	57	68	147	129	65	55	2	24	38
Spain ..	1,041	1,128	1,352	937	1,294	1,709	12	251	353
Yugoslavia ..	490	165	609	351	568	35	4	215	455
Greece ..	24	36	180	125	251	18	7	24	87
U.S.S.R. ..	2	-	-	68	-	39	27	-	390
Turkey ..	136	323	138	195	167	31	2	27	61
Poland ..	43	98	443	575	328	1	4	195	38
Czechoslovakia	207	28	34	76	397	6	52	92	396
Hungary ..	3	116	1	354	18	1	82	2	32
Rumania ..	175	76	146	201	174	-	-	27	94
Bulgaria ..	-	42	-	-	28	-	1	21	17

Appendix 22 (continued)

METAL FORMING (cont'd)

Country of Destination	Hammer and forging	Mechanical presses	Hydraulic presses	Shears	Wire working machine	Machines for screws, nuts	Other metal forming	Scrap packet machines	Spare parts
B) Overseas ..	3,419	4,293	3,402	6,275	7,406	2,460	421	1,883	3,216
I) Africa ..	553	1,052	1,112	1,086	1,033	438	55	192	618
U.A.R. ..	23	81	687	171	35	31	-	3	169
Libya ..	-	0.5	-	28	66	-	-	-	1
Ghana ..	35	9	5	67	19	-	-	-	1
Nigeria ..	11	19	26	39	5	-	-	-	46
Congo(Leopoldville)	1	35	3	51	115	-	-	9	12
Kenya ..	16	65	-	3	41	-	2	5	6
Republic of S.Africa	440	811	326	635	652	405	34	174	231
II) North America ..	775	423	510	1,681	1,231	89	161	317	738
U.S.A. ..	706	375	510	1,472	1,048	164	150	261	610
Canada ..	69	49	-	208	183	51	11	56	128
III) Latin America ..	514	672	529	1,008	1,036	574	61	439	601
Mexico ..	37	155	96	75	194	71	5	45	51
Venezuela ..	5	16	24	282	161	4	17	77	144
Brazil ..	96	21	7	131	216	317	2	204	104
Chile ..	60	16	105	28	18	95	0.5	11	27
Argentina ..	303	255	273	127	40	44	1.0	43	95

Appendix 22 (continued)

Country of Destination	Hammer and forging	Mechanical presses	Hydraulic presses	Shears	Wire working machine	Machines for screws, nuts	Other metal forming	Scrap packet machines	Spare parts
				METAL FORMING (cong'd)					
IV) Asia ..	1,234	2,058	1,221	2,076	3,185	901	109	662	1,106
Iran ..	10	35	160	89	81	-	2	16	55
Israel ..	46	143	63	83	165	65	4	18	53
Pakistan ..	121	209	98	412	153	49	8	31	81
India ..	326	247	391	191	1,823	93	13	347	551
Thailand ..	18	22	3	49	7	31	1	8	51
Malaysia ..	1	21	1	42	4	-	-	1	15
Indonesia ..	21	16	16	36	15	-	2	12	3
Philippines ..	7	89	16	59	16	18	1	-	44
China ..	52	66	7	101	22	214	-	-	2
North Korea ..	-	-	-	-	-	-	-	-	-
South Korea ..	-	-	-	3	22	17	-	2	1
Japan ..	602	1,161	393	377	700	402	66	201	171
Taiwan ..	7	25	9	5	2	-	3	-	2
Hong Kong ..	1	2	3	116	68	-	4	-	8
Australia ..	321	85	28	329	830	295	35	270	133
New Zealand ..	17	1	-	90	92	36	-	-	19

Appendix - 23

Exports of German Machine Tools by Types, 1964

Type of Machine	Value in Mill US $	Weight in Tonnes	Value per Tonne in US $
Planing, Shaping and Broaching Machines	10.8	5,359	2,015
Lathes - Cutting and Threading	34.6	13,521	2,558
Automatics & Turrets	29.7	7,604	3,905
Drilling and Tapping	20.5	6,598	2,652
Milling and horizontal Boring and Milling	42.6	14,700	2,897
Sawing & Filing	9.9	4,920	2,012
Grinding, Honing and Polishing	54.9	15,792	3,476
Gear Cutting	18.5	4,651	3,977
Other Metal Cutting	20.3	4,788	4,239
Accessories etc	17.4	4,389	3,964
Forging and auxiliary equipment	13.5	6,413	2,105
Mechanical presses	25.9	13,820	1,584
Hydraulic presses	12.8	9,109	1,405
Sheet working	24.3	12,435	1,954
Wire working	25.0	6,850	3,649
Screw making	11.0	2,660	4,135
Other Metal Forming	1.1	315	3,492
Scrap briquetting presses	7.9	3,526	2,240
Accessories etc	15.4	7,022	2,193
Total Machine Tools	392.9	144,471	2,719

Source: VDMA, ibid

Appendix - 24

List of Interviews Made by Survey Team

WEST GERMANY

Dates of Visit :	22.5.1968	to	5.6.1968
Team Members :	IIMC		DCo
	Prof. B. Kumar		Mr B. Varma

Name of Firm/Organisation	Persons Interviewed	Designation
(A) Manufacturers :		
1. WOTAN Worke GMBH - VWF Werkzeugmachinenfabriken 4 Dusseldorf-Holthausen Reisholzer-Werftstrasse 76 Dusseldorf.	Mr Ing Karl Heinz Lowenthal VDI	Asst. Works Director
2. Schiess Aktiengesellschaft 4 Dusseldorf Oberkassel Schiess Strasse Dusseldorf.	(1) Dr Ing Karlheinz Ganser, (2) Mr Heinz Josef Altegoer	PROKURIST Works Engineer
3. Oswald Forst GMBH 565 Solingen Schutzenstr 160 Solingen.	(1) Ing Hans Joachim Schmitz (2) Mr Eugen Forst	Production Manager Proprietor
4. KLOPP Factory Solingen	(1) Miss Kemper (2) Mr Schmitz	
(B) Distributors :		
1. Representative of HMT Hindustan Machine Tools Ltd. D 6 Frankfurt am Main 1 Im Sachsenlager 15 Frankfurt.	Mr Ranganathan Yogeshwar	Export Manager (Europe)
2. Jerona 6, Frankfurt.	Mr H. Strack	Sales Manager

	Name of Firm/Organisation	Persons Interviewed	Designation
(C)	Users :		
1.	F. H. Schule & Company Hamburg.	(1) Mr Petersen	Sales Director
		(2) Mr Merck	Production Director
2.	Maschinenfabrik Augsburg-Nurnberg (MAN) 85, Nurnberg Katzwangerstr.	(1) Mr Roth	Works Director
		(2) Mr Zurner	Chief Engineer
(D)	Government Officials/ Associations :		
1.	Engineering Export Promotion Council, Dusseldorf.	Mr Ahluwalia	Foreign Officer
2.	Wilhelm Holm Export Association of German Machine Tool Makers Monckebergstr 11 Hamburg 1.	Mr R. F. D. Gathmann	Manager
3.	Association of the German Machine Tool Dealers and Tool Wholesale Inc 62 Wiesbaden Webergasse 28 Wiesbaden.	Mr Walter Neumann	General Manager
4.	Association of German Machinery and Machine Tools Manufacturers (VDMA + VDW) 6, Frankfurt.	Mr Siebert	Statistical Director
(D)	Others :		
1.	German Development Consultants 624 Konigstein im Tanunus Wiesbadener Strabe 92 Wiesbaden.	Dr Ram Uberci	

Appendix 24 (continued)

Name of Firm/Organisation	Persons Interviewed	Designation
2. Deutsche Bank Dusseldorf.	(1) Mr Bandomir (2) Mr Jahrig	Export Manager Credit Dept. Dir.
3. Ubersee - Post 85, Nurnberg Bankgasse 1.	Mr F. Gutschnaidt	Marketing Manager
4. University of Erlangen-Nurnberg 85, Nurnberg Findelgasse 7.	(1) Prof. Dr E. H. Sieber	Dean, of Economic and Social Science Faculty.
	(2) Priv. Doz. Dr L. Berckoven	Prof. of Marketing

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